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Understanding the Strategic Value of Services – a Case Study in a Semiconductor Company

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Abstract

Servitization has been recognized as one strategic choice for many manufacturing firms to obtain differentiation from competitors in today's highly competitive markets by offering value-added services. Servitization can be defined as "a change process wherein manufacturing companies embrace service orientation and/or develop more and better services, with the aim to satisfy customer's needs, achieve competitive advantages and enhance firm performance" (Ren and Gregory, 2007).

The purpose of this study is to understand the potential that the semiconductor company Infineon Technologies AG has to develop a servitization strategy and to recognize the drivers that could lead the organization to follow that strategy and the barriers that could prevent the development and implementation of a servitization strategy.

A multiple case research design on the semiconductor company is used as the research methodology. This study answers the following strategic questions: How can the organization potential to develop a servitization strategy be characterized?; Why should the organization consider developing a servitization strategy?; Why could the organization be prevented to develop a servitization strategy?

The findings show that the organization that there is potencial for the organization to develop a servitization strategy. Some drivers to have the organization considering such strategy were identified, as the services mean to compensate the decrease of product profit margins, to have a better differentiation and competitive advantage or to help to sell more products. However, in order to develop and implement an servitization strategy, the organization should overcome a set of challenges related with the organization culture and structure, the services design, development and delivery process, the internal and external communication of the services value, the pricing strategy and with the sales of services.

Keywords: Servitization, service strategy, customer value, pricing of services, sales of services

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List of Abbreviations

AE – Application Engineer

CSI – Case Study I

CSII – Case Study II

FAE – Field Application Engineer

FSE – Field Sales Engineer

Infineon – Infineon Technologies AG

PSS – Product Service System

SBU – Strategic Business Unit

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1 Introduction

In a challenging world of global competition, traditional manufacturing firms are being forced to pursue and develop new and innovative ways to compete and to adapt to the new constrains and demands in the markets. One strategy is to create value through the addition of services into their products. This phenomenon is defined as servitization.

With a dissertation, it is expected a new discover or a new consideration of an old subject: a real contribution for the progress of science (Salvador, 1978). Taking this in consideration, the focus of this dissertation is a case study at Infineon Technologies AG (Infineon) to understand, with a real example, how services can be relevant in manufacturing, focusing on the strategic value that these can bring to a manufacturer.

This chapter provides a presentation of the company where the research took place, the research scope and objectives, a summary of the methodology used and an overview on structure of the dissertation.

1.1 Company Presentation

Infineon Technologies AG is a German firm founded in 1999 as a spin-off from Siemens AG. With a global presence (Europe, America, Asia), it has 34.000 employees worldwide as per January 2015. Acting in the semiconductors industry, Infineon offers semiconductors and systems for automotive, industrial, power management and multimarket sectors as well as for chip card and security products. The main focus areas of Infineon are:

- Energy efficiency – Optimal electricity use is achieved by harnessing smart semiconductor technology: innovative chip solutions fine-tune cars, industrial plants, consumer and household electronics to use less energy;

- Mobility - Sensors, microcontrollers and power semiconductors are used in the automotive body and convenience systems, safety and drive systems and raise the energy efficiency. Infineon Technologies innovative semiconductor solutions are instrumental in significantly reducing fuel consumption and CO2 emissions, enhancing automotive safety and in making cars affordable for all, including emerging nations;

- Security – Infineon semiconductor security technologies protect digital information from misuse. It resolves the incompatibility of communication requirements and privacy. By combining hardware security and encryption technology, Infineon's chip solutions form the basis for data protection and data security while upholding the freedom of the individual and supporting modern, convenient communication media.

Infineon strives to be the semiconductor innovation leader for energy efficiency, mobility and security. Their solutions help society to grow while preserving the environment, reflecting the company responsible and radical reaction to worldwide changes like globalization, climate shift and population increase. The company way to success is marked by the financial strength, on having unique competitive advantages (create customer value through technical expertise, application and system understanding, innovation power and trusting relationships) and to focus on a high performance (ambitious goals and a clear focus on results,

entrepreneurial decision-making and lean and fast execution). In addition, the company guides itself by four core values:

- "We commit" – to satisfy the customers' needs, walk the extra mile for its commitments and offer the best price-performance value;
- "We innovate" – to learn and get better every day, discover and develop new opportunities and excel in outstanding engineering;
- "We partner" – to openly cooperate across boundaries, respect and help each other and team up for the best results;
- "We perform" – to embrace constructive conflict, to be accountable for its results and actively capture its profit potential.

1.2 Scope and Objectives

This project was developed as part of the dissertation project of the Master in Services Engineering and Management of Faculty of Engineering of Oporto University at Portugal. It was conducted at Infineon Technologies AG in Munich, Germany within the Business Innovation Office. This department exists to provide consulting to improve the existing business or to generate new business ideas and also to build up the employees' knowledge in general business innovation methodologies.

In response to competitive and economic pressures, a growing number of manufacturing organizations are adding services to their traditional product offerings. The central subject of this dissertation is servitization in manufacturing firms and the objectives of this study consist in understanding the potential that Infineon has to develop a servitization strategy and to recognize the drivers that could lead the organization to follow that strategy and the barriers that could prevent the development and implementation of a servitization strategy.

Complex markets and customers, lower profit margins and higher competitive intensity are stressing the strategic importance of services (Oliva & Kallenberg 2003; Kowalkowski, 2010), leading the traditional product manufacturers to alter the way they view services (Gebauer et al. 2005; Gebauer 2008). For Infineon, this study could be an opportunity to develop a new perspective on services within its business industry, focusing on how these could be a mean to differentiate itself from the competition, to increase profit, customer satisfaction, loyalty and relationships.

1.3 Methodology

This study employs a multiple case study research. Yin (2014) defines case study as "an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world, especially when the boundaries between phenomenon and context may not be clearly evident". The evidence of a multiple case study is frequently considered more captivating and the study is overall stronger than a single case study (Yin, 2014). The decision for multiple cases was based on that principle and on the results of the data collection, being suitable to allow the verification of consistency of similar results. Within the case study research, it was decided to use a qualitative approach. It was considered the most suitable technique as it studies phenomena in the environments in which they naturally occurs.

Qualitative research addresses questions about how social experience is shaped and given meaning and produces representations of the world that make it visible (Gephart, 2004).

The data collection started with a multi-disciplinary review across the fields of servitization, service infusion, product-service systems and industrial services was done, aiming to increase the knowledge on this subject. Through an intensive reading phase, the most relevant information and that could bring value to the study was acknowledged. In order to obtain a general overview of products and services delivered by Infineon and to recognize all topics and main problems relevant for this study, a set of unstructured interviews was done. From these interviews, two case studies were identified and taken for this study: one product service solution (PSS) with an explicit service component and one PSS with an inexplicit service component. Semi-structured interviews were used as the main source of data for the cases. According to Yin (2014), interview is one of the most relevant sources of evidence for a case study. In addition to the semi-structured interviews, it was possible to access some documentation related with the two PSS. Yin (2014) states that "documentary information is likely to be relevant for every case study topic". The unstructured interviews were not recorded and the notes taken were grouped in major themes that consider the objectives defined for this study. The semi-structured interviews were recorded except one (there was not consent for recording) and then transcribed. The data was as well organized in themes and subthemes to facilitate the data analysis. Due the existence of multiple cases, cross-case synthesis logic was used in the data analysis process, by observing and comparing similarities and differences between each case, being complemented with the data from the unstructured interviews.

1.4 Dissertation Structure

To enlighten the reader how this document is built, a brief description of its structure is provided.

This study has been categorized into five main chapters. The **first chapter** presents an introduction and context to this research, identifying its scope, objectives and the methodology chosen to provide an answer to the research questions. It is on this chapter that the dissertation structure is presented as well. On the **second chapter**, the theoretical framework is presented, focusing on the relevant subjects for this dissertation. This literature review gives an overview of servitization theory, value in services, on the classification of services and the drivers and challenges of servitization. It is also provided a theoretical background about the pricing of services. The **third chapter** provides an insight on the questions driving the investigation and introduces and discusses the methodology used on this study, presenting the methods that were generally applied within this investigation. It aims to describe how, why and in what way the research was carried out. On the **fourth chapter**, the empirical findings and results from the case study research performed at Infineon are presented. The information and data gathered is analyzed and discussed in the same chapter, providing a comprehensive linking between the findings and the literature study. The **fifth and last chapter** presents the conclusions of the work done and the limitations of the research. Furthermore, recommendations for future research are discussed in this chapter as well.

2 Literature Review

This chapter includes the analysis of the relevant literature in the area of servitization and related concepts such as service infusion, industrial services and product–service systems, considered to be a good theoretic basis for this work. It starts with a general concept of servitization, going through the value in servitization and the classification of services. The drivers and challenges of a servitization approach are identified and described so as the pricing strategy for services.

2.1 Servitization in Manufacturing

2.1.1 Concept of Servitization

Traditionally, manufacturing firms have focused on strategies related with products, trying to achieve a technological innovation, improve the quality of the products and to reduce costs. The increase of the competition, the globalization of markets and the shifts in customers' demands, have made difficult for manufacturers to trust on this kind of strategy (Lay et al., 2010, Wise and Baumgartner, 1999). As a way to overcome these challenges, a significant trend in manufacturing industry has been observed in the past years, where the firms are shifting their business from not purely producing goods but to provide an offer of integrated package of goods and services. This shift on business has been called as servitization firstly in 1988 by S. Vandemerwe and J. Rada. They have defined servitization as "the increased offering of fuller market packages or "bundles" of customer focused combinations of goods, services, support, self-service and knowledge in order to add value to core product offerings". Since then, this concept has been studied by several authors who have focused on developing the process of servitization as a competitive business strategy of manufacturing firms so as its consequences in the product saturated markets. Baines et al. (2009) have gathered some of the different definitions of servitization from some of the relevant authors as follows in Table 1:

Table 1 - Definition of servitization (adapted from Baines et al., 2009)

Author	***Definition of servitization***
Vandermerwe and Rada (1988)	"Market packages or 'bundles' of customer-focused combinations of goods, services, support, self-service and knowledge"
Desmet et al. (2003)	"A trend in which manufacturing firms adopt more and more service components in their offerings"
Verstrepen and van Den Berg (1999)	"Adding extra service components to core products"
Lewis et al. (2004)	"Any strategy that seeks to change the way in which a product functionality is delivered to its markets"
Ward and Graves (2005)	"Increasing the range of services offered by a manufacturer"
Ren and Gregory (2007)	"A change process wherein manufacturing companies embrace service orientation and/or develop more and better services, with the aim to satisfy customer's needs, achieve competitive advantages and enhance firm performance"

It is clear that the terms service and product are inherently linked to the definition of servitization and, to have a brief definition of the two terms is considered appropriate for a servitization related study. In manufacturing, a product is understood as a material artefact or as "a tangible commodity manufactured to be sold and fulfil a customer's need" (Goedkoop et al., 1999) and a service can be translated as "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself." (Vargo and Lusch, 2004).

The definition of servitization or the terms used may change but its essence lies on the transition process of including services to create value into a goods-based offering and the relationship between the manufacturer and the customer is a key factor. The phenomenon is also seen as a move downstream in the value chain, towards the customer, and consequently achieving additional revenue from operations (Wise and Baumgartner, 1999).

Furthermore, the literature recognizes positioning along a product-service continuum that goes from the offering of traditional services (add-ons to manufacturers' products) to the provision of the services that become the main part of value creation process (Baines et al. 2010). To Oliva and Kallenberg (2003), the transition to a servitization approach assumes that firms reposition along a product-service continuum, where it moves from basic product oriented services towards a more customized process oriented services. At the initial point of the continuum, it is assumed that a manufacturing firm produces core products and services are considered as an add-on to the product. On the opposite side of the continuum, firms provide services and their products are only an add-on to the services. As a result of this assumption, the importance of services increase and the customer relationships become long-term and closer (shift of the nature of customer interaction from transaction-based to relationship-based) as further the manufacturing firms move along the product service continuum. However, manufacturing firms need to consider the individual opportunities and challenges of the different levels of service infusion to decide the appropriate positioning (Gebauer et al., 2008a). The product service continuum from Oliva and Kallenberg (2003) is presented on Figure 1 as follows:

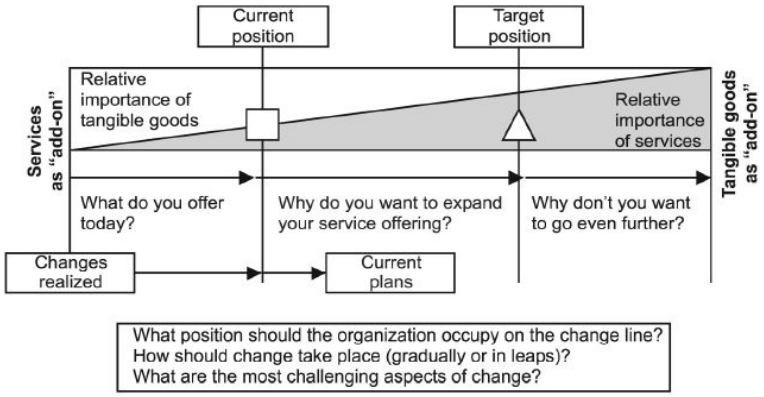

Figure 1 - The product service continuum (Oliva and Kallenberg, 2003)

Additionally, concepts like service infusion, integrated solutions, product–service systems, industrial services have emerged, aiming to describe the rising importance of services in the manufacturing industries. Despite these have developed from differing perspectives in the

world, they reach to a common assumption that manufacturers should focus on offering integrated solutions of goods and services (Baines et al., 2009).

The principal of servitization is not just the service addition but rather a service orientation in which manufacturing companies are not only expanding their product offering with services but as well developing new offerings where products are no longer at the center of the company's value proposition or even of its business model (Kindstrom, 2010). In general, servitization can be understood as the focus on the shift from selling products to selling integrated solutions (by adding services) that will deliver value in use. Manufacturing firms should be able to comprehend how customers will use their integrated solutions in a way that will increase the value proposition offered.

2.1.2 Value in Services

From the perspective of servitization, value co-creation has shift the traditional idea of value creation (where producing goods that can be sold as the exclusive purpose of economic activity, the productivity and profitability are the value drivers for the organization and customer value is imbedded into the goods and services by the company) to a new value paradigm where customers actively co-create value with the organizations (Vargo and Lusch, 2004). Customer value has been used in different contexts to indicate the customer evaluation of utility, worth, benefits and, in some scale, the monetary gains (Yu-Lee and Haun, 2006). Recently, the customer value definition has raised two significant distinctions:

- **Value-in-use**: it suggests that the customer plays a role as creator of value while using the product or service. This idea consists with a service dominant logic, where the value is not determined at the manufacturer or embedded on the goods but that is defined by the customer through the usage of the product or service to accomplish its business goals. In this value-in-use concept, the manufacturer creates merely the value proposition and customer apprehends that value in its specific processes and business context (Vargo and Lusch, 2008);

- **Value-in-exchange**: in this concept, customer value is considered to be determined by the manufacturer through its products which are switched for money or equivalent (Grönroos, 2008). It is also associated with a goods dominant logic.

Grönroos (2008) states that "applying the terms value-in-use and value-in-exchange, the former is more important than the latter. If customers cannot make use of a good, value-in-exchange is nil for them. Since they have paid good money for nothing, it is actually negative. Only during consumption, realized value in the form of value-in-use is created.". He adds also that "customers are not primarily interested in what they buy and consume, but in what they can do with what they have in their possession. They use resources in self-service processes in order to "get something out of it". In other words, they use resources to get something of value for themselves.".

The recent literature shows as well that the value of something is determined by the user and not by the manufacturer. Being able to provide value is the essence of making profitable any product or service and, when selling services, it is important to understand what customers consider valuable (Neely, 2008). If the organizations don't have the ability to create value for customers, these will not be willing to pay for it. It can then be determined that "a value proposition creates value for a customer segment through a distinct mix of elements catering to that segment's needs." (Osterwalder & Pigneur, 2010).

Multiple stakeholders within an organization perceive value resulting from a manufacturer offering in different levels. At the corporate value, value-in-use is evaluated by decision makers while users have the tendency to have their own appraisal of value-in-use (Macdonald et al., 2011). Usually, customer has different stakeholders in the negotiations and each one expresses its own sense of value. However, value-in-use at both user and decision maker level contribute heavily to the customer organization's comprehensive view of value and it is suggested that a value proposition that emphasizes value-in-use is better positioned to consider the needs of various value evaluators than value-in-exchange (Kowalkowski, 2011). Moreover, upper-level functional managers are more likely to seek and sign up for services than entry-level managers. When services and solutions address strategic problems with long-term implications for a company, the decision to hire advisors would necessarily involve the highest levels of top management (Zeithaml et al., 2014).

The construction of an effective and successful value proposition is extremely dependent on a profound understanding of the customers' needs and business. It is not enough to just ask customers what they want and what their needs are. A proper value proposition should as well facilitate the customers understanding on the possible benefits that services can deliver, especially when the organization charges a fee for them. Showing the actual numbers or statistics of what the offer is capable of is one possibility to simplify the comparison of benefits and price, and can be used too as a selling argument for the salespeople on the supplier side (Edvardsson et al,. 2005; Gebauer et al., 2005; Grönroos, 2008; Neely, 2008; Neu and Brown, 2005). On the whole, by understanding value-in-use, manufacturers will be able to develop appropriate value propositions for their servitization strategies. Value from a service perspective is no longer based on the exchange value determined by manufacturing companies but on the value-in-use defined by the customer according to the perceived benefits of the services (Vargo and Lusch, 2008).

2.1.3 Classification of Product Services

The services traditionally offered by manufacturing firms are seen as an add-on to their products, like the after-sales services (e.g. installation, maintenance, warranties, etc.) but, throughout the years, the scope and flexibility of manufacturing services have been increasing and some definitions exist to show the balance between products and services, illustrating the different levels of servitization.

Kotler (1997) distinguishes the industrial services in two categories: **maintenance and repair services** and **business advisory services**, which can be perceived as services that facilitate the use of the supplier product.

Frambach et al. (1997) proposes that product services can be categorized according to the type of relationship between customer and provider: **transaction related service** or **relationship related service**, related with services supporting the supplier's product.

For Mathieu (2001a), the services provided by manufacturing firms can be classified in two types:

a) **Services that support the supplier's product** – goes in the direction of the traditional view of a service offer and the main goal of such service is to guarantee the correct functioning of the product and/or to facilitate the customers' access to the product. The direct recipient of the service is a product, the intensity of the relationship is low (people and

departments involved and the importance of commitment and trust between parties), the service is standardized and the predominant variables are the physical evidence and the process;

b) **Services that support the client's action in relation to the supplier's product** – it's a more advanced perspective of the product services offering where the manufacturing firms explores how their services support specific customer initiatives and how these will support the customer core activities (maximize all the different processes, actions and strategies that are related with the supplier's product). The direct recipient of the service is the customer, the intensity of the relationship is high, the service is highly customized and the predominant variables are the people (supplier and customer personnel).

Mathieu (2001b) goes further and states that there can be an additional component on the services that support the client's action: services as a product. The services offered by the manufacturing firm might not be related to any of their products. As companies become more customer and service solutions focus, it is a natural extension to also support other companies' products.

Zeithaml et al. (2014) adopt a very similar classification as Mathieu: services that support the product (the customer expects these services to go hand in hand with the product), services that support the customer (services that are higher level and have higher value, focusing on the customer) and services that supports other companies' products.

One more example is the classification proposed by Tukker (2004) of three main categories of product services:

a) **Product-oriented services**: the main goal is still the sales of products but some extra services are offered. Along with the product, the firm provides services that are required through the use phase of the product (product-related service) and gives advice on its most efficient use (advice and consultancy services). Examples of such product-oriented services can be a maintenance contract, a financing scheme or the advice on the organizational structure of the team that will use the product;

b) **Use-oriented services**: in general, the product is not owned by the customer and this pays for the use or availability of the product. There are three types of use-oriented services: product lease (the provider has ownership of the product and is responsible for maintenance, repair and control, while the lessee pays a fee to use the product), product renting or sharing (has the same characteristics as product lease plus the fact that the user does not have unlimited and individual access to the product) and product pooling (quite similar to product renting or sharing but here there is a simultaneous use of the product);

c) **Result-oriented services**: the customer and the provider agree on a result and there is no pre-determined product involved (a result or capability is sold instead of a product). Here, Tukker (2004) also distinguishes three types of result-oriented services: activity management/outsourcing (a part of an activity is outsourced to a third party), pay per service unit (the user does not buy the product but only the output according to the level of use), functional result (the provider and the customer agree in the delivery of a result).

Neely (2008) introduces two additional categories to Tukker's framework, naming them as:

a) **Integration oriented PSS**: related with the downstream movement by adding services through vertical integration. Same as the product-oriented services category, product

ownership is transferred to the customer and the provider aims for vertical integration (e.g. by moving into financial or consulting services);

b) **Service oriented PSS**: the services are incorporated into the product itself. However, the product ownership is transferred to the customer and merely additional value added services are provided as an essential part of the offering.

The developing categories of services illustrate the extent of alternatives available to manufacturing firms to harness real value in their service business.

2.1.4 Drivers of Servitization

From the literature, there is a threefold logic why product firms should seek for a servitization strategy: financial, strategic and marketing (Mathieu, 2001b; Oliva and Kallenberg, 2003; Gebauer and Friedli, 2005; Gebauer et al., 2006, Gabauer and Fleisch, 2007). More recently, environmental sustainability aspects have been highlighted as additional drivers of servitization (Mont, 2002; Baines et al., 2007).

The **financial drivers** outline that services are expected to bring additional economic benefits to manufacturing firms because usually services serve as a mean to sell more products. They have as well higher margins than products and provide a more stable source of revenues as services are more resilient to the economic cycles (Oliva and Kallenberg, 2003; Gebauer et al., 2006; Gebauer et al., 2008b). Brax (2005) and Brax and Jonsson (2009) recognize also that services can be a possibility to balance the effects of the economic cycles because their demand is frequently counter-cyclical as compared to products sales cycles. If services can offer higher margins than products, leading to a higher share of total revenue with services, the overall profitability of the manufacturing firms will increase (Gebauer and Fleisch, 2007).

Firms that have adopted a servitization strategy have a tendency to keep the revenue stream and to increase the profitability especially in sectors where the product involves a hard installation procedure (Baines et al., 2009). Nevertheless, financial benefits are accessible merely if the manufacturers are able to setup a pricing strategy that can cover the costs of delivering the services (Mathieu, 2001b).

Despite the benefits mentioned, Gebauer et al. (2005) introduces the concept of service paradox: manufacturing firms might strongly invest in their service business in order to increase the service offering without obtaining the expected increase in revenues. Many managers fail to perceive the financial benefits of services. Changing from the existing product oriented cost monitoring system to a system where actual service and product costs are transparent to have a comprehensive understanding of the service market and to adapt the organizational structure and processes are some of the recommendations to overcome the service paradox and to implement a successful service approach (Gebauer and Fleisch, 2007).

The success factors for achieving high service revenues in manufacturing companies have been studied by Gebauer et al. (2006) and are presented as follows: develop market-oriented services and to have a clearly defined service-development process as this will be essential to understand the customer needs; the service offerings should start with product-related services (ensure the proper functioning of the supplier’s product) and be extended to services directly supporting the customer; relationship marketing can assist in convincing more customers to purchase more services because it positively affects customer expectations by set up a high

company reputation; establish a clear service strategy that focuses on promoting and creating new services; to have decentralized service organizations with profit and loss responsibility; establish a service culture.

The **strategic drivers** concern with gaining competitive advantages (Baines et al., 2009). The difficulty to differentiate the product offering has been increasing for manufacturing firms and the differentiating strategies based on product innovation, technological superiority and low prices are becoming even more difficult to maintain (Baines et al., 2009). As products can be physically comparable, adding services to them might be the only way to achieve differentiation. Customers in industrial markets have been demanding turnkey solutions to problems instead of products that partially solve their needs and services can enhance the value of the product to its users (Frambach et al., 1997). Gebauer et al. (2009) adds that remaining profit margins is an issue for manufacturers, forcing them to discover new differentiation opportunities, and moving towards services becomes a smart way to achieve competitive advantages and to sustain overall profitability.

To include services in the manufacturing firms offering is advantageous especially in matured markets allowing the company to grow and to gain new competitive opportunities. Besides being a mean to respond to customer demands, services can be considered also as a way to differentiate the manufacturing firms' offering from their competitors, hence retaining old customers and obtaining new ones. (Mathieu, 2001b; Brax, 2005; Gebauer et al., 2008b; Brax and Jonsson, 2009). Services are more difficult to imitate as they are less visible and more labor dependent, thus becoming a sustainable source of competitive advantage (Oliva and Kallenberg, 2003).

Marketing opportunities can be understood as the use of services for selling more products (Gebauer et al., 2006; Gebauer and Fleisch, 2007). The service component is known to influence the purchasing decision (Baines et al., 2009) and industrial customers are demanding more services, creating a pressure to build more flexible firms, to narrow definitions of core competencies and to increase technological complexity, making manufacturing firms to raise the outsourced services (Oliva and Kallenberg, 2003).

The expansion towards services is viewed as a necessity to generate and manage long-lasting relationships in business-to-business markets (Mathieu, 2001b). As services are frequently offered as long-term contracts, opportunities to strength the relationship with customers, to increase customer loyalty and to obtain knowledge about the customer, can be provided to manufacturing firms (Gebauer at al., 2008b). By offering different product services throughout the several stages of the relationship lifecycle, the manufacturer can adapt to the customer needs. This may lead to a more intensive relationship between the two parts and thus leading to more transactions over time. This relationship becomes less institutionalized and manufacturer is able to customize homogeneous physical products and to develop more tailored solutions (Frambach et al., 1997).

A recent trend of **environmental sustainability** concern has also been considered to have an impact on servitization. The expectation is that a pure product service will have a lower environmental impact than a traditional transaction where a manufacturing produces its goods but then transfers the responsibilities of ownership and use to the customer (Baines et al., 2007). With a product service system approach, there is the potential to decrease the number of products by introducing alternative scenarios of product use (e.g. sharing, renting).

Manufacturers are advised to take back their products, upgrade or renovate and use them again and, in the end, less waste is incinerated or landfilled (Mont, 2002).

2.1.5 Challenges of Servitization

Despite servitization being a good approach for a manufacturing firm to increase profitability, to gain stability, to grow and to achieve customer intimacy, it does not come without challenges. These can be generally categorized as integrated product service design, organizational strategy and organizational transformation (Wise and Baumgartner, 1999; Oliva and Kallenberg, 2003; Brax, 2005; Slack, 2005; Baines et al., 2009).

The **design of services is significantly different of the design of products** because services are fuzzy and difficult to define. This influence the way services are perceived by customers, how service quality is defined and how service innovation is managed (Slack, 2005). This may also discourage manufacturing firms from expanding the service dimension because as these companies move towards services and solutions, the market environment changes. New and unexpected competitors, such as own suppliers, distributors or customers, need to be considered in the service strategy so that the offering provides more value to the customers and to secure the firm's competitive position (Mathieu, 2001b; Oliva and Kallenberg, 2003; Baines et al., 2009).

Gebauer et al. (2006) define service strategy as a company's means to differentiate itself from the competitors with the service offering and an appropriate service strategy depends on the competitive intensity of the markets, the business environment conditions, the complexity of customer needs and the value chain position on the manufacturing firm (Gebauer et at., 2010a). Constructing a service strategy denotes a downstream transition in the value chain, in the direction of customers and increasing the attention given to the end user to enhance the knowledge about it (Vandemerwe and Rada, 1988).

One of the main challenges when developing a service strategy is related with the necessary internal changes on the organization. The implementation of such strategy implies an operation through the organization, with the main goal of increase the service oriented aspects. According to Gebauer et al. (2010c) it is required to create an ability to deliver services, to train personnel to become service oriented and to cultivate, in some extent, a new organizational culture to comply with the new strategy. A service strategy is not static and has to be adapted to fit the changes in the competitive environment. The first challenge that manufacturing firms should overcome in the transition process is to develop a service strategy, which requires the investigation of the existing organization culture, human resource management, organizational structure and service development operations (Gebauer et al., 2010a).

Setting up a service oriented **organizational culture** entails the entire company to re-focus its attention (Brax, 2005). Managing the transition phase in manufacturing firms can be challenging as a traditional product oriented culture differs significantly from a service oriented culture. A manufacturing firm, whose strategy centers on products, has led to a human resource management and organizational culture to become focused on products and should apply a change in the strategic perspective so as to acquire new skills and people in order to enter the business effectively. These changes request new ways to measure the firm and employees' performance, as well as new inducements and rewards to encourage

employees to take on a service-oriented approach of doing things (Wise and Baumgartner, 1999). The servitization entails a shift in employees' mindset and this change should be encouraged by managers, requiring a solid internal marketing based on a enhanced understanding of customer benefits from services (Gebauer et al., 2005).

Another challenge in the transition to servitization is related with the **organization configuration**, meaning the structure of roles, responsibilities, decision rights, resources and rewards that is conductive to developing and delivering services and solutions. The degree to which management in manufacturing companies anticipates the returns from service business depends on their capability to design a configuration of organizational elements that suits the external business environment (Neu and Brown, 2008). One critical success factor suggested by the literature for the transition to services is the creation of a separate services and solutions organization with a dedicated sales force, information system, metrics, control system and profit and loss status. Gebauer et al. (2010d) state that "separating services from the product business means that form create a distinct strategic business unit (SBU) for services that fully control the targeting of customers and the development, pricing, selling, and delivery of service offerings. As a distinctive SBU, the service organization takes over the financial responsibilities for profit-an-loss in the service business.". The reason pointed is that traditional manufacturers are not able to understand how to provide services and frequently consider them as add-ons. Furthermore, the revenues and profits of developing services are small compared with the financial rewards of products and manufacturing companies must learn to value, sell, deliver and invoice services (Zeithaml et al., 2014). There are, on the other hand, few researchers that support integrating the service operations in manufacturing firms but, if a business unit wants to servitize its operations, it has to have a customer centric configuration in order to allow the implementation of the service strategy and support the service oriented cultured (Brax, 2005). Concerning the decision making, Neu and Brown (2005) consider that vertically decentralized decision making is a suitable mean for an organization to become more customer and service oriented because managers at lower levels are closed to customers and might be able to recognize better their service needs and to better understand how to align operations with identified needs.

For a manufacturing company that has been product oriented and focused on technology and internal processes, to develop market oriented services can be a challenge in the transition to offering services. Martin and Horne (1992) suggest that **new service development** is seen as an obstacle for firms because the development process is frequently unstructured and it goes behind the product development as organizations consider service innovation as something that "just happens". In order to be successful in developing new services, a company should have a structured, formal and customer oriented service development process, consisting in the identification of the market needs, the conceptualization and setup of the idea and carry out its introduction into the market. If a new service development process is implemented effectively, it can be a way to differentiate the service offering when introducing into the market (Gebauer et al., 2006; Gebauer et al., 2010b). Having the knowledge on the customer business context and operational conditions is important as services are designed to support the customers' business goals (Brax, 2005). The organizations should take customer input into the new service development process and treat customers as partners and design services together with them. The benefits of such involvement are more new services and solutions that better suit customer needs, create higher satisfaction and reinforce customer loyalty and company profitability (Zeithaml et al., 2014).

The **internal and external communication** is a significant point to take in consideration in the transition to services but to have the most appropriate approach is usually a challenge for traditional manufacturing firms. In order to have employees to commit to the goals defined, they need to realize the benefits of services and, to change the employees' mindset towards a service oriented culture, a strong internal marketing strategy is required (Gebauer et al, 2006). On the other hand, through external communication, manufacturing firms intend to alter customer perceptions, from selling high quality goods to providing exceptional services and fulfilling customer needs and requests (Gebauer et al., 2006). Communication is critical to diffuse to customers the benefits of the service offer (Mathieu, 2001).

One last challenge to be mentioned is related to an organization **finding the proper capabilities of employees who deal directly with customers**, as the salespeople, service technicians and delivery personnel. According to Zeithaml et al. (2014), as a firm shifts to services, many traditional salespeople will be unsuccessful in selling services and solutions because explaining services is different from explaining the physical attributes of a product. The sales process is usually more complex and strategic. The sales process has experienced a major change, going from a focus on transactions to a framework of interaction and building a relationship between seller and buyer. Sheth and Sharma (2008) state the transformation in the sales process from salespeople being valued based on their capability to sell goods and services by influence the customer through charisma and assertiveness, to a customer oriented selling that entails qualities as problem solving skills, satisfying customer needs and delivering customer service.

The change towards selling services and solutions has altered the role of the salespeople from a representative of the product to the consultant for the customer by developing long-term relationships (Sheth and Sharma, 2008). The importance of the service providers having the necessary skills to integrate the customer in the service creation process is increasing as the role of the customer alters also in the service creation process, making it as a co-creator of the service (Ulaga and Loveland, 2014) and salespeople who adapt the customer oriented service approach make a greater effort to meet the customer needs. Getting to know the customer processes and culture leads to a higher customer satisfaction and higher levels of performance (Sharma, 2007; Ulaga and Loveland, 2014).

Salespeople in manufacturing firms normally have training in cost analysis and are educated to highlight the practical and technical features of goods (Neu and Brown, 2008) but there are significant differences from selling services to selling goods. Selling services is a process of understanding the customer needs and creating a customer solution (Ulaga and Loveland, 2014) and requires salespeople to have different skills to sell services, as compared with selling goods. It is fundamental to have salespeople prepared to comprehend and meet customer needs and so it is necessary for the salespeople to have training in communication, problem solving, flexibility and adaptability (Sharma, 2007; Ulaga and Loveland, 2014). This training will provide salespeople adequate listening abilities and the capacity to customize solutions based on customer needs (Ulaga and Loveland, 2014). With the right training, salespeople can obtain the tools to successfully create service solutions (Gebauer et al. 2005). Furthermore, Gebauer et al (2005) highlight that it is only possible to have an effective fit of the service approach if salespeople have the correct mindset to integrate the training into the service provision.

Likewise, the traditional reward model for salespeople may not be suitable as it is typically based on the amount of sales. The incentive for selling some services may be less than for selling products because they often have a lower price and this can lead to lower commissions for the salespeople (Zeithaml et al., 2014). The literature recommends that the compensation should be based on customer satisfaction and profit and sales growth. The financial compensation is an enticement and a significant driver in the development of a service-oriented business (Sharma, 2007; Sheth and Sharma, 2008).

It is crucial to have salespeople with an extraordinary level of knowledge and experience to acquire a complete understanding of the customer operating processes, leading to the creation of optimized solutions (Ulaga and Eggert, 2006). Customers commonly have difficulties to express their needs in an effective manner and value the manufacturer aptitude to ask the proper questions (Kapil et al., 2007). The manufacturing firm know-how is then a significant value-adding feature in the long-term buyer-seller relationship and a close interaction in a long-term relationship can reduce the customer price sensitivity (Kapil et al. 2007). By developing interpersonal connections between customer and provider through frequent communications, the particular needs of the customers can be understood and problem solving is consequently enhanced (Ulaga and Eggert 2006; Kapil et al. 2007). Moreover, purchasing people on customer side are often too low in the organization's hierarchy to sign contracts for more costly and complex services, especially when integrated with products. This entails supplier salespeople to have greater investigative skills to identify and connect with the key decision makers. The manufacturing firms should, as well, to develop professional consultative selling capabilities as the provider needs to learn more about the customer business and priorities and the salespeople must go from transactional to relationship based selling, where customers can view them as trusted advisors. Moreover, people in service delivery positions should be able to listen carefully, learn and respond quickly, anticipate customer needs and engender support across their own companies. These attributes will contribute to a greater customer satisfaction and loyalty (Zeithaml et al., 2014).

2.1.6 Pricing of Services

The pricing of services is as well a recurrent issue for numerous manufacturing companies since there is uncertainty about when transitioning from offering a customer services free of charge to charge for them. Though some firms decide to offer costly services for free as a mean to build loyalty, studies demonstrate that free services do not necessarily have an increasing effect on loyalty. Free services that are not valuable to customers have no purpose and are unnecessarily using resources that could be applied for creating revenue generating services (Witell and Löfgren, 2013).

Servitization requires changes in the manufacturers' traditional organization but the revenue models should be rethought and the way product and service offerings are priced should be modified (Barquet et al. 2013). The pricing definition has a significant influence on revenue streams and profitability and an inadequate pricing could explain why several companies find difficult to achieve the financial potential of an extended service business (Gebauer et al., 2005). The pricing is also related with the difficulty of developing value propositions. Goods oriented companies are experienced at pricing tangibles but not at pricing intangible services and solutions. The pricing of services has to fit customer perceptions of value and set a figure that will encourage customers to use the service or solution (Zeithaml et al., 2014).

Traditionally, the pricing is distinguished between cost, competition and value based. In the cost based pricing, the manufacturer defines the price taking the cost plus a chosen profit margin. In the competition based pricing, the market pressures influence the price. In the value based pricing, prices are proportionate to the value created for customers (Hinterhuber, 2004; Nagle and Hogan 2006). The cost based pricing dominates the manufacturing industries but it is seen as not effective in a service oriented business (Kindström et al., 2012). The firms remunerations should relate to the value impacts on the customers' business rather than calculated based on the service cost (Oliva and Kallenberg 2003; Gebauer and Friedli 2005). So, the manufacturing firms moving towards a more service oriented business model should gradually shift from cost to value based pricing strategies (Rapaccini, 2015). The value-based pricing strategy is considered to be the most advantageous pricing strategy for services. This fits especially on the category of services that are more complex, as consultancy services (Johansson et al., 2003). Two essential understandings on this pricing strategy are to recognize the customer's willingness to pay and to recognize how customers' value perception of the service can be improved (Kotler et al., 2009). In general, pricing of services might be perceived as unfair by customers as services are less defined than the tangible goods and the sales of the services can be compromised. Due so, it is important to have in consideration, when choosing the pricing strategy, that this is communicated to the customers as rational and righteous and that the value of the service and its relation to the price has to be properly communicated to the customers.

Regarding the way the price is presented to the customers, the services can be bundled or unbundled: respectively, either there is a global price for products and services or the service is priced individually. Basic services, as the after sales services, are often sold separately from the product but there are cases where product-centric firms bundle the products and services into "all-inclusive offer" to avoid the pricing question (Ulaga and Reinartz, 2011). Oliva and Kallenberg (2003) refer that standard and unbundled services are sold to start up the service business in the first stage of servitization and, on the other hand, integrated service offerings are typical of more servitised firms. The shift from unbundled to bundled offering goes from transactional business to long term relationships with the customers.

Regarding the revenue models, Windahl et al. (2004) state that servitised companies should move "from pricing of product and service items to comprehensive contracts, based on sharing risks and rewards between the provider and the customer". Through these agreements, the "customers require that the suppliers assume some level (or all) of the process outcome risk", and risk transfer is a reason for customers to accept these agreements (Ulaga and Reinartz, 2011).

3 Research Methodology

This chapter introduces the overall methodology used on this study in order to secure its academic quality. It starts by addressing the research problem and questions. Furthermore, this chapter presents the methods for data collection and qualitative measures to evaluate the quality of the research results.

3.1 Research Problem and Questions

Infineon is a company inserted in the semiconductor industry and has always been an innovator, focusing on technology leadership and product excellence. This competitive strategy has suited the company in the past years but the increase of global competition, the customer expectations, the large investment in technology and the difficulty to capture the value of that investment shows that it will not be sufficient to stay competitive and remain profitable. This way, the company is forced to differentiate and add more value to their offerings to be able to stay competitive. Moreover, semiconductor industry is well known for its market instability and there are some key market features that contribute to that instability: rapid growth cycles, severe price fluctuations, rapid technical innovation and frequent capacity imbalances (Doering and Nishi, 2008). Generally, the semiconductor industry has shown a strong cyclical behavior. During times of economic prosperity, the chip industry thrives but, during economic downturns, revenues come under pressure as corporate budgets are cut back and consumers refrain on acquiring the latest gadgets. Competition is intense, with product innovation, operated by assertive research & development (R&D).

Nonetheless, manufacturing companies have always provided services, either through offerings in the aftersales market (e.g. installation, maintenance) or through customer support activities (Kowalkowski et al., 2013). In the last decade industrial manufacturing companies have found essential and beneficial to shift further towards providing services and solutions rather than just providing manufactured goods (Oliva & Kallenberg 2003; Kowalkowski et al. 2012).

Taking these challenges in consideration and the expected benefits of services, the objectives of this study, as mentioned on Chapter 1, are to understand the potential that Infineon has to develop a servitization strategy and to recognize the drivers that could lead the organization to follow that strategy and the barriers that could prevent the development and implementation of a servitization strategy. With this in mind, the following main research questions were defined:

1 - How can the organization potential to develop a servitization strategy be characterized?

2 - Why should the organization consider developing a servitization strategy?

3 - Why could the organization be prevented to develop a servitization strategy?

3.2 Research Methodology

The research methodology is a process of selection of the investigation strategy, determining the choice of the data gathering and must be suitable to the objectives previously defined for the study so as to answer the research questions. In this phase, the researcher assures that the

instruments are valid and can be trusted (Fortin, 2003). All methodological decisions are important to guarantee the reliability and quality of the research results.

3.2.1 Multiple Case Study

According to Creswell (2007), there are five approaches that can be used within the qualitative research: narrative research, phenomenology, grounded theory, ethnography and case study. Narrative research can be understood as the "text used within a context of a mode of inquiry in qualitative research, with specific focus on the stories told by individuals". Phenomenology describes the "meaning for several individuals of their live experience of a concept or a phenomenon. It focuses on describing what all participants have in common as they experience a phenomenon". Grounded theory intends "to move beyond description and to generate or discover a theory, an abstract analytical schema of a process". In the ethnography "the research describes and interprets the shared and learned patterns of values, behaviors, beliefs and language of a culture-sharing group". The case study research "involves the study of an issue explored through one or more cases within a bounded system".

This research aims to understand and analyze the characteristics of a specific reality (servitization in a semiconductor company) and, for that reason, it is considered relevant to conduct it as a case study. Yin (2014) defines a case study as "an empirical inquiry that investigates a contemporary phenomenon (the "case") in depth and within its real-world, especially when the boundaries between phenomenon and context may not be clearly evident". The case study handles with the technical distinctive situation in which there will be many more variables of interest than data points, relies on multiple sources of evidence, with data needing to converge in a triangulating fashion and benefits from the prior development of theoretical propositions to guide data collection and analysis. (Yin, 2014).

This study employs a multiple case study research. According to Yin (2014), the evidence of a multiple case study is frequently considered more captivating and the study is overall stronger than a single case study. The choice for multiple cases was decided based on that premise and because it is considered to be appropriate to allow checking consistency of similar results. Multiple cases allow comparisons that clarify whether an emergent finding is just distinctive to a single case or consistently replicated by several cases (Eisenhardt, 1991). Due so, multiple case studies should follow the replication logic and not a sampling logic, meaning that two or more cases must be included in the same study as the replication approach allows making comparisons and provides the possibility to draw patterns across the cases and obtain more reliability in the overall results (Yin, 2014).

The relative newness of the field of servitization and the absence of existing studies on the application of this phenomenon to the semiconductor industry were the main reasons to take this topic as main subject of the study. Within the multiple case study research, it was considered appropriate to conduct it with a qualitative approach. Qualitative research can be described as a method that studies phenomena in the environments in which they naturally occurs and uses social actors' meanings to understand the phenomena. It addresses questions about how social experience is shaped and given meaning and produces representations of the world that make it visible (Gephart, 2004). This kind of method is inductive and descriptive, as concepts, ideas and understandings are developed from the patterns found in the data, instead of collecting data to prove theories or to check hypotheses as it is on a quantitative

research. It intends to understand individuals' points of view without making any value judgment throughout the data collection phase (Carter and Henderson 2005).

3.2.2 Selection of Cases

On a first step, the Business Innovation Office sent a general email to people considered relevant to back up the research, informing about the context of the study and asking for their support. With this, some people have reached out and showed their availability to meet. Due so, meetings were scheduled according to their convenience. Some interviewees suggested other working colleagues to be contacted for this study and these advices were taken in consideration. Two of the interviewees were contacted by own initiative as it was considered they could be of value added. The aim was to get to know which products are offered in the Divisions, if there is any service related to those products and to get different outlooks about them. It intended also to apprehend how the different organization levels perceive services in their areas and to have a big picture about the different business units within the company, so that it would be possible to identify the most relevant cases for this study.

One of the most important sources of case study evidence is the interview (Yin, 2014). Based on the objectives defined for this study, it was decided to approach those meetings as unstructured interviews. This was considered the suitable method to obtain a general overview about products and services at Infineon and to identify all topics and main problems pertinent for this study. Minichiello et al. (1990) defined the unstructured interviews as interviews in which neither the question nor the answer categories are predetermined. Instead, they depend on social interaction between the researcher and the interviewee.

A total of 10 unstructured interviews were conducted with people from the different business units at the company (Divisions), in different positions on those areas and also people located in the different continents were the company is present (Europe, Asia and America) and took a total of 7 hours and 10 minutes. In average, each conversation lasted 43 minutes. In the beginning of each conversation, a brief introduction about the objectives of the study was presented and the anonymity and confidentiality of the data was assured. The conversations were not recorded and only notes were taking during the meetings. Furthermore, no interview guide was prepared for the unstructured interviews. Rather, during the conversation with the interviewees, questions were generated in response to their narration. It was thought that people would feel more comfortable to talk about the subject, allowing them the flexibility to go in any direction that could be considered relevant.

The sample has 10 interviewees, 8 are male and 2 are female, corresponding to 80% and 20% respectively. A list of the interviewees is shown on Table 2 – Unstructured Interviews: Interviewees List. For the people located in Munich, the meetings were done face to face at Infineon headquarters. For the people located somewhere else, the meetings were done via phone. Considering the people rights to anonymity and confidentially and that this was guaranteed to all informal interviewees, it was decided to not identify the interviewees by their names but by using an acronym.

Table 2 - Unstructured Interviews: Interviewees List

Interviewee	*Gender*	*Position*	*Location*	*Duration*
UI1	Male	Vice-President	Livonia, USA	01h20m
UI2	Female	Department Manager	Singapore, Singapore	00h18m
UI3	Male	Business Developer	Munich, Germany	00h19m
UI4	Male	System Methodology Architect	Munich, Germany	01h26m
UI5	Male	Director	Munich, Germany	00h50m
UI6	Male	Senior Manager Application Engineer	Munich, Germany	00h51m
UI7	Female	Director	Munich, Germany	00h28m
UI8	Male	Department Manager	Munich, Germany	00h36m
UI9	Male	Application Engineer	Munich, Germany	00h30m
UI10	Male	Senior Application Engineer	Munich, Germany	00h36m

Based on the information gathered from the unstructured interviews, a list of mentioned services and solutions at Infineon was elaborated. Taking in consideration the objectives and research questions defined for this study, it was decided to take a sample of two product service solutions and analyze them separately as individual case studies based on the following perspectives: a PSS with an explicit service component (the services are clearly differentiated in different levels and each level has an individual pricing) and a PSS with a inexplicit service component (the services are not clearly differentiated on the solution provided and pricing is frequently free of charge). On both cases there was a clear attempt to rethink services to create value into the goods-based offering. These two cases can help to understand if it is possible to have a services strategy within the organization and what were the main drivers and challenges faced to embrace services. The selection of the number of cases is not done on statistical grounds in multiple case studies. Instead, the topic should be approached conceptually. Multiple cases are used to add confidence to the findings (Miles and Huberman, 1994). As per Creswell (2007), it is appropriate to select unusual cases in collective case studies and employ maximum variation as a sampling strategy to represent diverse cases and to fully describe multiple perspectives about the cases.

3.2.3 Data Collection

An empirical research should begin with a solid grounding in related literature (Eisenhardt and Graebner, 2007). Therefore, this study integrates a multi-disciplinary review across the fields of servitization, service infusion, product-service systems and industrial services. With the literature review it was intended to identify issues and gaps and to strength the theoretical basis of the study even before going into the field.

The step after the literature review was the collection of information about existing services and solutions at Infineon Technologies and the gathering of data for this research took place from June 2015 to August 2015. This concerns to the unstructured interviews explained on topic 3.2.2 Selection of Cases of this chapter.

After the selection of cases was finalized, the list of people to be contacted was prepared and it was decided to use semi-structured interviews as the main source of data, supplemented with documentation analysis. The semi-structured interviews are flexible and contained an interview guide with open-ended questions, allowing the interviewee to freely express and justify his opinion. The interview guide used for the semi-structured interviews can be found

on Appendix A - Semi-Structured Interviews Guide. As mentioned previously, according to Yin (2014), the interview is one of the most relevant sources of evidence for a case study. Interviews are a broadly used tool to access people's experiences and their inner perceptions, attitudes and feelings of reality (Fontana & Frey, 2005). Moreover, Yin (2014) suggests that the multiple case study design uses the logic of replication, in which the inquirer replicates the procedures for each case.

The interview guide was developed to approach the following topics: the PSS features, the service(s) details, the PSS design with focus on services component, development and delivery, the pricing and the financial context of the PSS, the strategic context and the sales context.

Creswell (2007) states that it is important that, when determining the sample to use, to properly and better represents the population in a way that is possible for the research to obtain information and quality about the problem in study. The interviewees for the two case studies were selected considering a relevant variation of people that could provide a diversity of perceptions and opinions, by providing specific information about the product service solutions and expressing their experiences. On Case Study I (CSI) – PSS with an explicit service component, the sample of interviewees consists of five people: the Program Manager responsible for the creation of the PSS and the service model, one engineer involved on the design, development and delivery of the PSS, one Application Engineer (AE) that is currently responsible for the PSS and two salespeople involved on the selling of the PSS. The financial controller responsible for the PSS was contacted via email but did not show availability to be interviewed. On Case Study II (CSII) - PSS with an inexplicit service component, the sample of interviewees consist of four people: the person responsible for the customer services department, one engineer involved on the design, development and delivery of the PSS, one financial controller for the business unit and one salesperson. An interview was scheduled with an additional internal salesperson but it was cancelled as per her request. Due to time constrains, it was not possible to replace this interviewee.

The sample for the two case studies has 9 interviewees, 8 are male and 1 is female, corresponding to 89% and 11% respectively. A list of the interviewees is shown on Table 3 – Semi-Structured Interviews: Interviewees List. Considering the people rights to anonymity and confidentially and that this was guaranteed to all informal interviewees, it was decided to not identify the interviewees by their names but by using an acronym.

Table 3 - Semi-Structured Interviews: Interviewees List

Interviewee	*Gender*	*Position*	*Location*	*Duration*	*Service*
SI1	Male	Director Program Manager	Munich, Germany	01h24m	CSI
SI2	Male	Senior Staff Engineer	Milpitas, USA	00h46m	CSI
SI3	Female	Field Sales Engineer	Munich, Germany	00h53m	CSI
SI4	Male	Application Engineer	Munich, Germany	00h33m	CSI
SI5	Male	Sales Segment Manager	Bristol, UK	00h55m	CSI
SI6	Male	Department Manager	Munich, Germany	01h08m	CSII
SI7	Male	Application Engineer	Munich, Germany	00h59m	CSII
SI8	Male	Business Line Controller	Munich, Germany	00h44m	CSII
SI9	Male	Corporate Account Manager	Gémenos, France	00h38m	CSII

Interviews invitations were sent to the people containing an overview of the objectives and research questions of the study and asking for their availability to answer some questions. For the people located in Munich, the meetings were done face to face at Infineon headquarters. For the people located somewhere else, the meetings were done via phone.

A total of 9 semi-structured interviews were conducted and lead to a total of 8 hours. In average, each conversation lasted 52 minutes. In the beginning of each conversation, a brief introduction about the objectives of the study was presented and the anonymity and confidentiality of the data was assured. Also, the consent for the interviews to be recorded in audio format was obtained from all participants in the interviews except from interviewee SI4. He showed some concerns about the information to be shared and only notes were taken during the interview.

Besides the semi-structured interviews, it was possible to have access to some documentation related with the two PSSs. According to Yin (2014), "documentary information is likely to be relevant to every case study topic". The documentation consisted on presentations with all the details of PSSs for CSI and documents with customer satisfaction survey results for CSII. This documentation allowed corroborating the information obtained from the semi-structured interviews. Yin (2014) refers the use of multiple sources of data as one of the principles of data collection for case studies and designates it as triangulation. Triangulation increases the reliability of the data and the method of gathering it. In the context of data collection, triangulation derives from the ethical need to confirm the validity of the processes, corroborating the data collected from other sources. In case studies, the use of multiple sources of data could also do this.

3.2.4 Data Analysis

Data analysis in qualitative research consist of "preparing and organizing the data for analysis, then reducing the data into themes through a process of coding and condensing the codes, and finally representing the data in figures, tables, or a discussion." (Creswell, 2007).

The information from the unstructured interviews was not recorded but only notes were taken. It was considered to use the information resulting from the unstructured interviews to complement the findings of this study as a mean to fully apprehend the different perceptions of existing services and solutions within the organization. After reading through the notes, the data was grouped to represent major themes that describe the phenomenon being studied and that go towards the defined objectives.

All the conducted semi-structured interviews were recorded except one and transcribed afterwards. As the interviews were conducted in English, the transcript was done in the same language. The recording of the interviews helped to minimize unconscious interpretations and the data gathered could be transcribed, processed and analyzed thoroughly. The transcript and analysis of the semi-structured interviews was done almost right after each interview was conducted. This method of early analysis led to developing strategies for collecting new data (Matthyssens and Vandenbempt, 2003). According to Maxwell (1998), early analysis not only focuses the following interviews but also tests emerging conclusions drawn from them.

In each case study, the data analysis approach was the same: each interview was analyzed distinctively and then a general overview of results of all interviews in the same case study was prepared and organized under more abstract themes: Product Service Offering,

Competition and Differentiation, Organization Culture, Organizational Configuration, Design, Development and Delivery, Value Proposition, Customer Satisfaction, Pricing Strategy, Economic Earnings and Sales of Services. The themes are related to the questions in the interviews but the additional issues that emerged during the interviews were handled in the same way in order to avoid losing any significant information.

The data was then coded and further organized under subthemes. The themes of analysis were not pre-defined but adapted to the data resulting from the interviews and analysis of documentation. From the reading and rereading of the answers of the interviewees, the themes started to emerge. Themes were then sorted and reconstituted, leading to the appearance of subthemes. The themes and the subthemes were combined and restructured again, merging the overlapping themes. In the end, 14 subthemes were organized under 10 themes. The coding result for CSI can be found on Appendix C (Table 16 - Categorization of Semi-Structured Interviews (CSI)) and the outcome for CSII is available on Appendix D (Table 17 - Categorization of Semi-Structured Interviews (CSII)). The data from the unstructured interviews was organized according the themes that emerged from the categorization of semi-structured interviews data, as a mean to complement the findings from the case studies. The results can be found on Appendix B (Table 15 - Categorization of Unstructured Interviews).

Due to the existence of multiple cases, it was used a cross-case synthesis logic in the data analysis. The technique is particularly pertinent if a case study consists of at least two cases. The technique treats each case study as an individual one (Yin, 2014). In this study, the use of cross-case synthesis was conducted by observing and comparing resemblances and differences between each case, being complemented with the data from the unstructured interviews. Eisenhardt (1989) states that the approach of studying each single case allows to find the patterns within it before comparing it to others. When comparing the cases, the focus was on similarities so as on the differences. The cross-case synthesis was performed with a method named mixed strategies (use of two methods: cases-oriented and variable-oriented analysis) where the cases were primarily analyzed in-depth and the key variables are developed. Afterwards, the cases are thoroughly compared by using these variables (Miles and Huberman, 1994).

4 Results and Discussion

This chapter presents data analysis findings obtained from the two phases of this research: the unstructured interviews and the semi-structured interviews and the documentation analysis. The findings for each phase are presented individually in line with the research design. Each study produces an empirically derived structure of themes and subthemes.

4.1 Unstructured Interviews

During the unstructured interviews, the majority of the people were aware that services are being provided by Infineon but these are always considered as part of the product. However, it was considered relevant to mention that interviewee UI3 asked for a services definition, so that he could be able to relate this with Infineon and also with what exists in his business unit. Interviewee UI1 considered that the service definition is not clear to everyone and that if services were called technical support instead of services, people would agree that exists at Infineon. However, if it is simply named services, people will not accept it and say that Infineon do not sell engineering services and that these will never be charged to the customers. Interviewee UI7 said that a lot of services are being provided by Infineon to the customers as part of the product business and that, most of the times, the products are sold with design in support or application engineering services included. The customer pays for the product and services are provided free of charge. The same interviewee said that currently, in her business unit, the services offered are paid via the product selling price, because the key accounts are buying enough products and therefore, the effort spent by the Application Engineers (AE) and the Field Application Engineers (FAE) in supporting the customers in their design in, is priced in in the product. The interviewee also mentioned that some people believe that, in the long run, this will pay off. Interviewee UI1 pointed out additionally that Infineon is providing services to customers but in an unconscious way (doesn't realize it) and that forgets how important this element is to the offering.

In interviewee UI7 point of view, customers got quite used to get services for free and that is very hard to reverse. The interviewee stated that if services are provided free of charge, then the organization is not liable for something that does not work as well as it should. If a service is done for free, as a sort of add-on, the customers might not complain about it. Customers might walk away but, if services are charged, contracts and liability clauses are needed and then the organization will be on an uncertain position. The interviewee stressed as well that the organization business model is based on the high end and large customers and that a big support can bring high returns. It was said too that the current model works because the key customers are placing orders of hundreds millions euros and the costs to help the customers to design in are priced in the product and it is part of the deal. Nevertheless, this interviewee emphasized that is open to think that not everything should be for free but that the product centric thinking might be problematic for any change and, on her opinion, the organization gives too much know-how to customers for free, expertize that sometimes exists only at Infineon.

On the other hand, interviewee UI1 stressed that if Infineon offers premium products, it should complement the products with premium services, in order to maximize its offering. Interviewee UI3 expressed a similar statement. It was mentioned as well that there are areas

within the company which do not understand the importance of services to provide differentiation in the market and there is the need to bring a consistent culture of services across the entire organization. He realized as well that there may be services in the organization for which it could be possible to charge customers for but, with the organization strong product based culture, people hesitate on doing it.

Interviewee UI7 was able to identify only two cases in the whole company were a price tag has been placed on services and these charged to customers. For one of the PSSs pointed out, the interviewee highlighted the issues faced to charge the services because it seems that the existing system does not allow selling services. The interviewee said that is senseless that the systems do not give people the flexibility to be more creative and that the organization strong focus on hardware, volume and mass production can somehow justify such situation. It was mentioned that, also for the same case, the services were only started to be discussed after the product press release was done. This statement goes hand in hand with another one where it was mentioned that services are not considered on the product design and development process from the beginning and that it is a big mistake that the product is developed and the go to market strategy is just thought after the product is ready. Thus the concept of services and support need to be considered from the beginning until the end of the product design and development phases. It was pointed out that the value proposition is not comprehensively thought as people only look at the product. If then people want to have services, they need to analyze the value chain, the value proposition, design an offering and realize if there is a service revenue opportunity or if services can be offered with the product and use them on price negotiations.

For interviewee UI1, the first step is not to tell people that services can be sold but that products and services go together and that they are already doing services and they need to realize that the services are part of the whole offer that makes customers consider working with Infineon. This interviewee added as well that services are important and that these should be mentioned in the moment of the sale and not after the customer had experience them. It is not just the product that matters but the great support that Infineon provides to the customers.

4.2 Case Study I - PSS with an Explicit Service Component

Products and Services

The PSS for this case study is quite new in the market (since 2014) and complex. It concerns to a wireless connection of base stations for mobile phones (the transceivers transmit and receive high frequencies signals and, with this approach, they deliver data over a link, which is wireless and the infrastructure is connected to the base stations). "*It is a complete transceiver which has a lot of devices mixed… so the device is quite complex.*" (SI2). The services included in this solution intend to facilitate the functioning of product. "*The service is mainly related to how to use our product in a system.*" (SI2). An overview of the services categories is presented on Appendix E - Table 18 – Services Categories (CSI) but services go from the first level support from a FAE, to some training days at Infineon laboratories, customers can have the visit and support of Infineon engineers, the boards reference design so as the software design for these or to have a joint development (customer and Infineon) within an agreed time frame and the work lab is done together. For example, with the Standard category, can have three days of training for two customer engineers at Infineon facilities and have the support from an AE via phone and email. "*The product itself we are not customizing,*

it is more around the product, how to customize their complete design around our products, meaning that the product is always the same but the rest around changes and this we can do with the different service modules we are offering. We have from standard support up to customizing the service." (SI1).

Competition and Differentiation

- ✓ **Competitors**

Currently, there are two main competitors for this PSS entering now in the same market (cellular infrastructure), located in USA. However, it seems that a lot of startups all over the world have started working on this kind of applications but it is not clear if they will end up exactly in the same market. "*The main competitors are coming from the US. A lot of startups are working on this. In the meanwhile there are 2 big US semiconductor companies which bought startups who are in competing with us and are now in this market.*" (SI1). The competitors can offer the same product as Infineon (e.g. the chip, the boards) but it is not known if they have the same service model. It is assumed by the interviewees that the competition might provide similar services but free of charge. "*I have not heard that they are offering such a service model. They offer what Infineon is offering usually. […] the chip and the boards.*" (SI2).

- ✓ **Differentiate Through Services**

All interviewees considered that the services component can help to differentiate the firm solutions from the competition. As the product is the same and can be comparable with the competitors offer, services can be a way to add more value to the product and to help to maintain old customers and acquire new ones. "*On the support level, we were quite forward coming with this model we have.*" (SI2). Interviewee SI1 added that services can be a way to support customers in solving their problems in a proactive way. With this service model, the customers can purchase any service category according to their needs and to have the support from Infineon engineers. With the previous approach, the engineers just waited customers to do the tasks on their side and then to reach them every time an issue came up. "*Yes, I definitely see services as an advantage because of this way how you do it, how you support them. It is a different way. The other way is more of that you wait and here we are more proactive.*" (SI1).

- ✓ **Quality of Services Delivered**

Concerning the services offered, the interviewees involved in the development and delivery of products and services were asked to rate the quality of the services from 1 (low) to 6 (high). Interviewee SI1 rated the services quality with a 4, interviewee SI2 rated it with a 5 and interviewee SI4 graded as a 6. This leads to an average service quality of 5. One of the reasons given for this rating was the newness of the service model and approach, being considered however that there is still room for improvement. "*Because we are also learning on how to improve the service (it is a new thing) and this we are doing as we have offered already a first idea of service, then the second one and we are now on the third idea of this service. I hope we will improve this further.*" (SI1). Interviewee SI2 and SI4 based his choice on the positive feedback from the customers. "*Because there some examples that I can give. There was a customer who tried to design everything with a competitor and it did not bring*

him anything. Then later he switched over to our solution. He bought everything from us. There is another customer that did the same. So, the customers are very appreciated about." (SI2). Interviewee SI2 mentioned, as well, the team members' know-how and the partner chosen to deliver the PSS as this is considered to be a very company: "*Because we know what we did and the partner is really good.*".

- ✓ **Importance of Services**

It was considered pertinent to get a general impression on the importance of the services in the semiconductors industry. The interviewees were asked to rate it from 1 (low) to 6 (high). Only three of the interviewees got an opinion about the topic. Interviewee SI1 rated the importance with a 4, interviewee SI2 rated it with a 5 and the interviewee SI4 graded as a 6, leading to an average importance of 5. The main reasons pointed were that customers always need support and the organization has to continuously assist them and this will improve the relationship with the customers and trust on the organizations and that this is an industry that is going more and more up the value chain. "*We have to help the customers and build a customer relationship.*" (SI1); "*Services are getting more and more important. It is getting more important because we are going up in the value chain.*" (SI2).

Organization Culture

- ✓ **Culture**

Regarding the organizational culture of the organization, all the interviewees said that, in general, the organization focus is on the product, besides the efforts to follow a more system approach (related with an initiative launched by the Management Board that aims to have a system approach, generating solutions that can create value to the customers). "*Our culture is more on the product.*" (SI1).

What was mentioned as well (and considered by the team as one of the major obstacles) was the internal people hesitance to accept the service model. Interviewees SI1 and SI2 mentioned that the internal people, in and outside the business unit (e.g. engineers, salespeople) place the same commentary about the creation of such model and why and how the customers would be charged for the services. "*Already there we had some questions like… How do you want to sell this? Why should customers pay for this?*" (SI1). The same hesitation was found at salespeople because they did not want to ask customers to pay for the services and could not understand the value of services. "*We asked sales to promote the service to their customers and that they have to pay for it. But it was difficult to convince sales that the service is something that you have to pay for.*" (SI1); "*But the feedback [from Sales] was mainly, we will not bring this to the customer. […] This must be for free.*" (SI2). Interviewee SI4 provided a similar statement regarding the salespeople resistance. From the interviewees feedback, this can be explained by the fact that charging customers for the services is not the standard process within the business unit. Usually services are provided to the customer along with the product and free of charge. "*Salespeople had some hesitation in showing this service model because the customer expects everything for free. Of course on a first step, they are hesitant to go to customer and say ok here you pay some thousands of euros for this service model.*" (SI1). From the way the interviewees talked about this topic, it was possible to denote the existence of a high resilience to change and the high focus on the product within the organization, taking the services to a second place, somehow as implicit on any product. One

of the interviewee statements could support that belief: "*All the support issue is nice to have. But the product features are the most important.*" (SI3). Nevertheless, the team that had the idea for the service model did not give up and decided to move forward. "*Even if we have this resistance, we will keep this model*" (SI1).

- ✓ **Focus on Key Customers**

According to the interviewees, the customers that buy the services are the smaller customers, meaning the ones that are not that much experienced in this industry field and that do not have many resources to do all the designs and setups around the product. On the other hand, the customers that do not buy the PSS are the bigger customers in the market. These have the know-how to work with the product and the necessary resources to do the design work on it. However, it is the key customers that get the services free of charge and, besides the high focus on the product, it was possible to denote also during the interviews a high focus on that type of customers and not so much on the smaller ones (besides being these who really needed the services support), as people consider that only these will purchase enough products to make the business running.

Organizational Configuration

- ✓ **Structure, Processes and Technology**

The business unit is organized around products categories and the organizational structure was not adjusted to meet the requisites of the new business model. "*There is nothing new in general, technology or processes… it is all existing.*" (SI1).

After the definition of the services categories, the team had to determine the contracts details for each category. Together with the Legal department, all the terms and conditions and statements of work were described. However, after deciding on the process to charge customers for the services, the Tax department informed that, due to tax reasons, it is not possible for Infineon to sell services but only products. The team also found out that the software where they define the products portfolio was not set up to take in services. This topic was highlighted by interviewees SI1, SI2 and SI4. "*The Tax group… they said services, Infineon cannot sell because this is not implemented in our systems. Then we thought oh, everything is done and now we have to stop.*" (SI1); "*We developed internally the way to get the money from the customers and this was the most difficult task because we found out at the very end that, due to tax reasons, it is not possible for Infineon to sell services.*" (SI2). Further discussions with Tax department took place and they advise that the only possibility would be to sell the services together with the hardware. The team decided to take the suggestion and services are then being sold "as a product". Due to this limitation, the customers cannot truly differentiate the service from the product and the AEs or FAEs have to explain directly to each customer what will be done so that they can clearly understand what is on the package they are purchasing. "*Then we said we always give the hardware with these services and the services are for free.*" (SI2); "*We sell the hardware and the services are for free. To the customers we say a different story. The services they have to pay. Internally we say one story and externally we say another story.*" (SI1)

Design, Development and Delivery

- ✓ **Services Design and Development**

As per team understanding, as several functionalities have been integrated into one solution/chip where there were so many components before, the product would be much more easy to use and customers would not have any doubts on what to do with it. However, the opposite has happened. Due to the complexity of the product, the team started to receive a lot of questions about it. "*We said it should be much easier now but it was the opposite as we got even more questions. For us, it seems that the product itself was interesting for the customers but it is not easy to understand.*" (SI1); "*We found that these devices are not easy to work with by some customers. Not all but some customers which have less telecom background. Even the customers who have telecom background, they still ask a lot of questions… how the board design should look like, how can they test the chip with software interface, how should they connect additional things around the chip.*" (SI2).

The realization that services would be needed to sell the product and the idea to build a service model came only after the product has been released. Recognizing the high effort needed to support the customers and to reply to the existing questions, some people in the team started wondering if there could be an opportunity to profit with it, besides with the product selling. "*So we thought that, if these customers have so many questions, the others will have even more. And if we have all this effort, why not try to get some money from this?*" (SI1). With this in mind, these team members decided to take the topic to the department meetings so that they could have the colleagues' perspective on this. "*With this, we had more discussions on our jourfixes where more people are in and they said yes, but nobody will pay for it.*" (SI1). Even with some resilience from the colleagues, the team decided to move forward and to try to setup a service model that could benefit the organization and create value for the customers. "*From the services point of view it was decided that if we would support this model, we could bring value to the customer.*" (SI2).

Lacking on experience on how to define a service model, they contacted other people within the company to get to know if something similar existed already so that they could somehow learn from any available experience but did not find any service model where services would be charged to the customers. "*We asked several people at Infineon if they had this and they all said no.*" (SI1). Interviewees SI2 and SI4 highlighted the same topic. The team approached then the Business Innovation Office to get assistance to develop a service model. Some workshops were set and the people involved to contribute to the service business model definition were the Program Manager, AE, colleagues from R&D, Sales, Marketing, Distribution, Quality and Finance. The first idea was to have a single service category that could fit all customers. Then, they looked at the type of questions being placed by the customers and realized that this would not suit the customer needs. They came up to ten different service categories but even these were considered to be too much and difficult to explain to the customers. "*First we thought on having just one service (one fits all) and then thought which questions customers were placing and, based one that, we realize that we could not put everything into one. Therefore the idea came up that we split this up and came up with 10 different services. But that was too much and nobody would understand.*" (SI1). After some attempts, the team was able to create five service categories and to define which kind of services each category would have (the hardware is always the same and what changes is the support level provided to the customers).

For this specific service model, interviewee SI1 mentioned that "*It was not create in a strategic way but at least in a conscious way.*". It was pointed also during the interviews that the current organizational culture allows integrating services but only when these are free of charge. "*The culture can allow services but there is a difference on the services that are free of charge and that are paid.*" (SI2). The understanding is that general services (e.g. support, training, reference design) have always to be provided along with the product and not charge for them as that is the customers' expectation. "*We deliver more information and more support on all levels of the value chain, that they* [customers] *always ask for a bit more and it is going up on the value chain what we have to do, and usually the culture is that these kind of support or services is not paid. It is the expectation. It is not paid but it is included.*" (SI1).

However, despite all challenges faced to set up this offering, interviewees SI1 and SI2 considered that services will be considered for future applications, especially to have in place such a service model with paid services. Nevertheless, they stressed that maybe this could be only applicable to complex products and not commodities (simple products and for which the competition is high): "*For the single products, I don't think a service model is necessary. It becomes really necessary when you are working on new technologies. […] I think we should follow this service model for any complex device.*" (SI2); "*We will definitely consider this for the other applications we are doing besides this.*" (SI1). The question related with this topic was not asked to the interviewees from sales because it was considered that the perspective desired had to come from the people that are involved in the design and development of products.

Taking the opportunity of discussing the design and development process, some interviewees were asked to give their opinion about the general services development process in their business unit and organization, looking beyond the experience with this specific solution. Those interviewees were the SI1, SI2 and SI4 because these are people used to be involved in such tasks. All interviewees agreed that there is a clear design and development process for the product but this does not exist for the services. "*In general, it is not really created in a conscious and strategic way. It is more by accident. […] When started this idea we looked around to see if this was existing somewhere… we don't know everybody in the company – it is too big, it is not easy to get all the info but at least we found out that such a process was not existing. This was one conclusion out of this investigation. But the process for services development does not exist in Infineon. I gave also this statement and nobody rejected this statement… in this Business Innovation Forum.*" (SI1). Interviewee SI2 added that despite there is no clear process to follow regarding services, the setup of the service model gave the team some experience and the feel that they can use it for future similar situations: "*In this case, it was the first one that we did and there was not a process that we could follow. It was quite complex to bring it together… but now we have the experience with this model, so in the future, in case we need something similar, I think it is much easier because we know now how to proceed internally with everything.*".

- ✓ **External Involvement**

In order to assist on the design and development of the product, an external partner was hired for the hardware and software design. This company does the design together with Infineon team and continues to be included on the delivery of the solution and providing support to the customers in case this is included in the service category chosen. "*A partner from Italy called*

[firm's name]. *They are doing the design together without team and one person is dedicated who will do this service support. The contracts are within Infineon decision*."

About the customer involvement in the whole process, the interviewees' feedback was that one customer was included in the product development phase but there was no customer involvement on the services design. For this, it was considered that the information the AEs and the FAEs collected on the customer needs was enough and that upfront customer involvement was not necessary. Also, the team wanted firstly to make sure that the product could be sold as it is considered the most important aspect. "*For the product, a customer was involved in the development phase. For the service, the customer was not involved in any stage. The reason was also that it was considered that customer should only be involved in the service when we knew that product could be sold. Otherwise, they would ask first where our product is, "give me first your product". If you want to sell this service, you need first the product as it is the most important thing and from where we want to get our money for. […] The customers were not really involved. The solution and service model were not discussed upfront with the customer. They are asked to give feedback on what to improve now that they use the solution. […] It was assumed that customer reaction would be that "we will not pay for it". But this is some kind of lesson learned and next time to involve the customers and ask what they want.*" (SI1).

- ✓ **Internal Communication**

To internally promote the PSS and the new service model in place, the team set up training sessions for any person within the company that would like get to know its features. Training has also been provided to people involved on the PSS delivery (e.g. FAEs, AEs, salespeople) so that they would be able to explain it and be prepared for any question a customer could place, as highlighted by interviewees SI1, SI2 and SI4. "*All people involved in the service delivery had a training and access to information about it (Application Engineers, Sales.).*" (SI1). However, when questioning interviewee SI3, she stated that did not get any information about the service model: "*Nobody explained honestly… I think it should have been explained to sales how to deal with it. Maybe there was a short presentation in PowerPoint, I don't know, I was not aware of it. I get to much info the whole day*". Moreover, interviewee SI5 stated something similar: "*As far as I know, none of the Distributors have been trained in any support model. […] I have not seen this presentation until today.*". Furthermore, both interviewees did not mention any proactive action to get the info about the service model or even to ask for training on it.

- ✓ **Weaknesses**

On the weaknesses mentioned for the design, development and delivery of the PSS was the additional effort and internal people needed to deliver the services, leading the business unit to have fewer resources for other tasks within the department. "*Is that additional people are needed, which are educated… which cannot do other tasks at the same time, which they usually could do, especially in the application engineering which are supporting customers.*" (SI1). It was also mentioned also the effort needed to train all relevant people (e.g. engineers, sales) as it is a new approach within the organization. "*Internally, requires also some training from the experts to the other people so that they understand this model because it has not been done so far by Infineon (it is a new way to deal for the company to deal with services).*" (SI1).

Value Proposition

When questioned about the value proposition of the solution and the value added of the services, all the interviewees mentioned the faster time-to-market and cost saving. "*We bring customers our expertise which helps him saving time and money. This is the value that this model has to customers.*" (SI2). With the services available within this solution, the customers can have the engineers support in all the required designs and have their products ready faster than if they try doing everything by themselves. "*With the one we are offering, we say ok, you can mainly copy and paste it.*" (SI1). This way, the customers can decrease the time taken from the moment the product is being conceived until it is available for sale and place their products in the market sooner than the competition. "*A R&D engineer with no help might need two months design and with our help they can get it in one month.*" (SI2); "*I would say, depending on the expert, it could take anywhere up to 6 months. So, the thing is, we, by supporting this, we could bring the customer into production quite fast.*" (SI1). At the same time, the customers can save on the number of people they have working on the product and maybe place them to work already in any other new product, a topic highlighted by interviewees SI1, SI2 and SI4. "*Customers also save on the number of people that have to work on this and can work already on another solution product (have more resources available for other tasks).*" (SI1).

Customer Satisfaction

The customer feedback has not been officially collected and the customer satisfaction has also not been measured until now but, based on the interviewees' feedback, the customers who already acquired the PSS really appreciate it and are quite satisfied with what has been provided. It was also mentioned that customers have a good perception of the quality of the services. "*Yes, they have a good perception of the quality of the services.*" (SI2).

Pricing Strategy

The pricing strategy for the product is cost-based (the cost to produce it plus a chosen profit margin) and this is the standard approach for any product in the organization. The pricing for the services is value-based (price is proportionate to the value created for customers). When choosing any of the service categories, the customers pay a single price for the product and the services (a package). The team decided to check what would the customers be willing to pay for the services (how customers would value them) and not look to anything the competition might be doing to decide on the best pricing. "*We say we will not look at the competition, we will see what the customer would gain from this … which way we could give for them… how much could it be worth.*" (SI1).

The quality of the services provided was rated by the interviewees as really good (average of 5) but they were not quite able to relate this quality to the possibility of having a premium price on the product. It was stated that the main goal is to have customers choose Infineon and to buy their products and to have the revenue with the product and not with the services. "*The reason we are doing this is not to get a premium price. Is to make customers buying from us and to have the revenue with us of the product, of the chip. The target of this service is not to get the premium price either on the service or on the semiconductor chip. This is more that we*

get them buying from us this solution and not from the competitor. To stay with us… it is a strategic reason." (SI1).

The top 3 customers have a high negotiation power and, afraid that these would not buy the product, it was decided to give them all the support services free of charge as long as they would settle in buying a determinate quantity of the product. "*The only discussion we had with the top 3 customers of this business was that they said "we will never pay". And there, for sure, we had to do a compromise because you are the number 1 or 2 in the world but you have to give us a business.*" (SI1).

Economic Earnings

The main economic earnings are still coming from the product. "*The main economic earning is still from the product selling. Because the price that we ask for the service is not hundreds of thousands, it is in the range of some thousands to ten thousands and the product has a high value itself and we are selling there much more. The revenue we get it via the product.*" (SI1). Despite not being easy for to define the price for the services, the team believes that they would be able to convince the customers to pay for them if showing how much could be saved. However, it was not intend to make a lot of revenue with the services but mainly to have the customers using and buying the products and to create a relationship with the customers and to increase their loyalty. "*When customers use this at different levels, at the end save this much (show the customers that they can save this much while paying some thousands for the service – it will pay off). The intention was not really to make a lot of revenue with the services model, we want customers using our product in the end and long term engaged with us and not working with competition.*" (SI1);

It was taken the opportunity to ask the interviewees if they consider that, in general, services can bring additional economic benefits to the organization. All the interviewees replied yes. "*I think so. It can bring additional economic benefits.*" (SI2); "*Yes, of course.*" (SI1). Interviewees said that customers are currently satisfied with the services provided and that can stimulate their interest for other services or products, contributing to potential product revenue increase. "*Customers are really appreciative about what we have done. Definitely arouses their interest.*"(SI2). However, it was also highlighted by interviewee SI1 that these possible economic benefits will depend on the market where the product is in and on the competition, despite agreeing that services can help to differentiate further from the competitors and to make the customers choosing Infineon for future projects. "*[…] and with the services I think we can differentiate further. If the customers pay for them as we are planning, we get also some additional revenue from that and have a good relationship with the customers, at long term, so they consider you for the next generation.*" (SI1).

Regarding the profit and revenue already obtained with this PSS, it was not possible to access that information. The Business Line Controller was contacted but was not available to answer some questions and the any of the interviewees have details about it.

Sales of Services

- ✓ **External Communication**

The product itself can be sold without the purchase of any service. The interviewees mentioned that the experienced customers in this field and with more resources should be able to use the product without any support. "*Because some customers are well experienced and say "I don't need this service. I know what to do.". They just buy the product.*" (SI1). On the other hand, it is not possible to sell the services without the product. The PSS can be shown to the customer or potential customers by FAEs, AEs or by salespeople. From the interviews, it was clear that the engineers are aware of the product and services details and feel comfortable enough to explain them to the customers (the reason might be because they were involved on the development or because they work on it every day). Conversely, salespeople did not show so much readiness to do the same. When questioned about how services were being explained to the customers, interviewee SI3 stated that the information available on the contracts is clear enough and it is considered enough to just forward the contract to the customer and ask for a decision. "*Honestly, I did not explain it to the customer at all.*" (SI3). Consequently, the value of the services is not shown by the same reason. "*The value of the services is not made visible because the contracts are just forward to the customer and he should read them and decide. So, in the contracts is shown very clearly what you get with your chips.*" (SI3).

- ✓ **Challenges**

One challenge related with sales of services mentioned by all interviewees was the fact that customers have to pay for the services. It is believed that competitors might offer the same services as free of charge and customers could not purchase Infineon product due to this. "*The other weakness of the service is that it takes usually a long time, on one hand, to develop it… then to convince the customer that it is worth that they use it and pay for it… the customer says that he wants to have this service, this support but the main topic we had so far, and still have, is that some customers say that the support should be free of charge and don't want to pay for this.*" (SI1); "*The customer has to pay some money to get this service. It could be that competitors are offering such kind of services, I am not sure but it could be that the competition could attract the customer by giving everything for free.*" (SI2). As the customers are not used to pay for the services, their first reaction is asking why they should pay for those services. "*They* [customers] *all asked "why should I pay for this?" It is standard. Why should I pay something? What do I gain? These were the questions we got in the beginning… but not only from our customers but also from our sales. I will not ask any money for this. How should I do this? Why? For what reason?*" (SI1). Two interviewees went further and said that salespeople are afraid customers would say that this is an irrational topic and that they will be punished in a future business. "*Salespeople are afraid that customer would say "Are you crazy? Why are you offering me this? I will never pay this.". The Region Marketing will also not do it if the Key Account Manager says "Don't offer this. I will get punished from them on other businesses.*" (SI1).

Moreover, interviewees mentioned the fact that this approach is completely new and to have to deal with customers' expectations of having the services free of charge. The salespeople are not used to have to ask the customers to pay for any service support and the missing background/explanation on the reasons to have such service model from the development team lead to additional difficulty to properly sell the PSS. "*Usually the discussions start "do I really have to pay for it?" because customers want to negotiate.*" (SI1); "*But this not the*

usual way to work at Infineon. So, I sell my product and customer expectation is that he uses the product and wants the support until a certain level. Of course they do understand if I that I can support until here and this one you have to do it on your own. This is standard… But this is exceeding the standard now." (SI3).

Another challenge pointed out by interviewees SI2 and SI3 was the paperwork involved in any transaction. "*It was a lot of paperwork, it is very complex. You have a service level contract, you have a frame agreement and it is quite difficult, to be honest. […] Paperwork is really one of the problems.*" (SI3); "*There are some customers that are too lazy and don't want to get involved on the paperwork.*" (SI2). People are used to simpler transactions and without so many parties involved (e.g. Infineon, partner assisting on PSS development and deliver, customers, distributors, etc.). This new service model brings different experiences and challenges but there is the impression that salespeople are not so open to this innovation and that do not really know how to act on new situations. "*If customer needs further support, you have to rework all these stuff… a new contract, a new Service Level Agreement… I don't know how it will work, I didn't have the case until now, what happens if you now switch from the basic to the standard, what happens if there is a price adder, is it just different or is it charged the whole price. I don't know and honestly, I don't want to have it because I think it is really… there would be serious discussions with the customers at the end.*" (SI3). On the Distribution side, one topic highlighted several times was the margin they could get with this PSS because it is considered to not be relevant enough to make them engaged to sell this Infineon solution. "*At the distributor level, it is an instant turn off.*" (SI5).

It was mentioned also that the services component might not have a significant influence on customer purchasing decision because the purchasing people at customers only concerns about the hardware price. The PSS can be shown to the customer R&D department (people who will really work with it) but their feedback does not affect the final decision from the purchasing team. Even if they really like the solution and want to have that, the buyers will look only at the lowest price. "*Buyers only look at the hardware price. When a project starts you do not discuss with the purchasing. You go to the R&D department. The department says everything is very nice, give me an offer for your calculation and, for Purchasing, you only get the hardware costs and the services do not influence.*" (SI3). Salespeople are not clearing showing the value of the services to the customers and there are no indicators to demonstrate the value of the services. On the other hand, one of the messages from the development team is that salespeople talk with higher hierarchies on customer side because they should be able to understand the complete value of the solution and not look to the price. "*Talk with management of the customer to explain the "value": save customer engineering effort & time to market. Engineers might not have the budget for services.*" (SI1); "*If are explained properly and convince the customer properly, this will have a big value for them.*" (SI2).

4.3 Case Study II - PSS with an Inexplicit Service Component

Products and Services

The business unit in study for this case study delivers security controllers and security memories. Along with the products, some services are provided to the customers. In order to have a clearer overview on the available services, these have been grouped in technical services, software services, standard services and production services and this overview can be found on Appendix F - Table 19 – Service Groups (CSII). The customers are technically

supported by doing the operating system because Infineon engineers know the architecture of the chip, they know how it works and they know how to program it in the most efficient way. Some examples of services are support via email or phone, the support of an onsite engineer, can also book trainings on a specific product or have consulting services from low to high level experts. The team can also do special measurements (some specific tests have to be done in the product so as some electrical measurements on it) as usually the smaller customers do not have the measurement equipment because they are extremely expensive. On the production services, for example, the customer has to load data on the microcontrollers and Infineon can do that on behalf of the customer. The organization has the tools and can do it much faster than the customer.

The products of this business unit can be sold without the purchase of any service but the products are so complex that it would be difficult for customers to deal with it without, at least, the technical support: "*We can say that is almost impossible to sell without the services. The complexity of our products is such that technical support is required. It is required to understand and to use our products.*" (SI9).

Competition and Differentiation

- ✓ **Competitors**

Currently, there are three main competitors in this business market and they offer the same products as Infineon. From what is known, the competitors offer similar services but there is not sure whether they charge for them or not. "*They offer the same product. […] They are offering similar services. Whether they charge it or not, I don't know but I assume they charge.*" (SI6).

- ✓ **Differentiate Through Services**

If the products offered are comparable, it was taken the opportunity to ask the interviewees for their point of view on how could the services component help to differentiate their offer from the competition. The interviewees SI6, SI7 and SI9 believe that services can help the organization to differentiate from the competition. The quality of the services may strengthen the organizations' brand but it is also important that the people that are selling the solutions demonstrates clearly the existing services and show their value to customers. "*If I know my competition is offering the same services and I am doing the same, what makes difference to the customer? That's by the quality and by the people that are selling the products, at least communicating the services to the customers.*" (SI7); "*If you have a unique product and unique selling point, possibly you don't need services because you are the only one having that product. But if you are in a commodity market, that means where there is a lot of competition and they have the same product and the only differentiator you have are the services.*" (SI6).

It was mentioned moreover that the markets are changing rapidly and that new and more complex products need to be explained to customers and that is where services play a role. A system expertise is needed and the plan is to look at the bigger picture, going from a product to a system perspective. "*And the business has changed as well. In the meantime we have some many other businesses, so we need some more services to explain the customer how to*

use the products and its characteristics. The system expertise is needed and this is where we go from product to system or having a bigger picture." (SI6).

Interviewee SI9 mentioned that, as per his experience, services contribute to the value perceived by the customers and that these always look at the big picture and past experience before purchasing something from a supplier. "*I know how my customers select their suppliers and what they do when they select the suppliers. They don't look only at the product features and the price. They also look at the quality experienced, the logistics support, the experience that they have with the supplier, how the supplier has performed in the past, on the security aspects, on technical support. So, that gives an overall picture. He can have one supplier with a very cheap product, very good quality but without the support and he can have Infineon, which is a lit bit more expensive, there is the exact same good quality but offers a worldwide team of available technical support engineers. I think that he will say "ok, I cannot risk start a development and then to block somewhere due to technical problems and making the technical support to solve it. So I would choose Infineon. It might be a little bit more expensive and can try to negotiate later on but at least I am assured that if I have any problems in the development, that the technical support is very professional and very capable to help me to solve my problems in a short term"*." (SI9).

- ✓ **Quality of Services Delivered**

Concerning the services offered, the interviewees involved in the development and delivery of these were asked to rate the quality of the services from 1 (low) to 6 (high). Interviewee SI6 rated the services quality with a 5 and interviewee SI7 rated it with a 6. This leads to an average service quality of 5,5. The reasons given for this rating was related with the engineers experience and know-how the high quality and the efficient way in which services are being delivered so as the positive feedback from the customers about these. "*I believe we are pretty good. Because of the experience and know-how.*" (SI6); "*Because we have a high responsiveness, we have high quality in our answers, we can solve the problems of the customer fast and in a very efficient way. From the engineering services we have high quality and that's the feedback we get on a regularly basis from most of the customers. They are really happy*." (SI7).

- ✓ **Importance of Services**

Concerning the future of services within the business unit, all interviewees considered that these will be growing. Interviewee SI6 added that these will relevant specially to get a broader customer area and for non-traditional businesses within this business unit. "*Especially with the respect to that first broader market approach, that we have to do more education, more trainings, more consulting and, the other hand, with respect to the non-traditional business, there more services will be needed.*". Interviewee SI7 said "*I think that the services part can increase especially when we address new segments, new markets, new customers because from the start we can start selling the services, let's say, as a separate part next to the products.*" (SI9).

It was considered appropriate to get a general point of view on the importance of the services in the semiconductors industry. The interviewees were asked to rate it from 1 (low) to 6 (high). Only three of the interviewees got an opinion about the topic. Interviewees SI7 and SI9 rated the importance with a 4 while interviewee SI6 was not able to decide on rating, leading to an average importance of 4. This question was not asked to interviewee SI8 as it

was thought that he might not have a full picture on the customers and market's needs. The main reason pointed for that rating was that services have value and that customers requisite them as some products are quite complex and customers always show interest on the support that can be provided. Interviewee SI6 was not able to decide on a rating because he considered that the importance depends on the type of product being offered. "*If you are in a commodity world, very high. If you have a different value proposition on your products, maybe not that high. It is really based on the products you are selling.*" (SI6).

Organization Culture

- ✓ **Culture**

Regarding the organizational culture concerning services, all interviewees said the company is product focused but that this business unit is services and customer oriented. . "*I believe this is not a real secret… Infineon is set to be a technology driven company.*" (SI6). Interviewees SI6, SI7 and SI8 highlighted a current internal initiative being currently being developed in this business unit to make them growing further by focusing additionally on customer needs and system. Due to confidentially issues, it is not possible to develop further on this approach.

- ✓ **Focus on Key Customers**

The customers that buy the services are the smaller customers (customers that are not that much experienced in this industry field and that do not have resources to do all the designs and setups around the product). On the other hand, the customers that usually do not buy the services are the bigger customers in the market (these have the know-how to work with the product and the necessary resources to do the design work on it). However, it is the key customers that get the services free of charge and, besides the high focus on the product, it was possible to denote also during the interviews a general focus on that type of customers and not so much on the smaller ones (besides being these who really needed the support).

Organizational Configuration

- ✓ **Structure, Processes and Technology**

This business unit has concentrated all efforts needed to support the customers and to provide the services in one single department and is comprised mainly by engineers. The FAEs provide the first level support to the customer and the AEs are the second level support. "*No changes were done, not really. So, we try to extend it* [services] *over the years. When I took over the department, about 9 years ago, it was not that. And the business has changed as well. I believe we tried always to be on the right level of services, depending on the level of business we have related to the product.*" (SI6)

Design, Development and Delivery

- ✓ **Services Design and Development**

Within this business unit, interviewees SI6 and SI7 considered that there is a clear service development process. The question related with this process was placed only to these two interviewees as these are the ones used to be involved in the product and service design and

development process. "*When we are developing a product, the need of a service is considered from the beginning. This is part of the development plan where the Product Marketing has to plan for trainings, for a rollout, for road shows… for a lot of things. As well for the documentation.*" (SI6). Interviewee SI7 mentioned that there was some kind of transition within the business unit, from product to system focus. However, he considered that it is not the ideal situation and that development team needs to be constantly challenged. "*So, in the past, when I started at Infineon, we had hardware development handbooks. Everything was focus on hardware and nobody thought about what does the customer needs in respect to software. Nevertheless, now we have a so called system development handbook and system really means system. But the reality is still, let's say, not ideal.*" (SI7).

One additional topic stated by interviewees SI6 and SI7 was that the feedback that the engineers get from the customers is usually taken to the product development teams so that take in consideration the customers' requests and needs in future projects. "*[…] what the people experience at the customers, their customers struggles or if the customer has a problem or they really like or whatever, we try to feedback that to our development, into our Marketing, that we using that information to the next generation of products. […] it helps the company as well.*" (SI6)

Taking the opportunity of discussing the design and development process, interviewees SI6 and SI7 were asked to give their opinion about the general services development process in the organization. The general assumption is that there is no clear service development process in the company, differently from what happens in their business unit. This opinion is based on the years they have been working at Infineon and the different experiences throughout the time. "*I don't think so. Because I have seen partly and I have talk to other people from other Divisions.*" (SI6). This same interviewee mentioned as well the organization culture focused on the product as another reason for the fragile service development process. "*I believe this is not a real secret… Infineon is set to be a technology driven company.*" (SI6).

- ✓ **External Involvement**

In order to deliver a part of the services, the business unit uses third party partners because they don't have the manufacturing capabilities but, in general, almost all other services are developed internally and delivered by the customer department itself. "*For the Tools, we have a partner but for the others we use at least 5 or 6 different partners. For the Tools we have external partners and for the rest we do on our own. For the Tools we need a 3rd party manufacturer because we don't have the manufacturing capabilities.*" (SI6)

- ✓ **Weaknesses**

On the weaknesses for the design, development and deliver process it was mainly mentioned the resources spent to provide the services and the fact that the customers not always paying for the services. The cost exists but most of the times there is no real accountable economic benefit with it. "*Mainly the headcounts. Customers do not pay for that standard technical services, it is just a cost center factor and you have to add that somehow to the total costs of the product.*" (SI6).

Value Proposition

When questioned about the value proposition of the PSS and the value added of services, the interviewees said that this lays on the combination of product and service. The product has good features but the customers need the support to have these working properly and according the regulations. With the services, the customers can have a faster time-to-market and cost savings. "*It is connected to each other, product and service. […] The services are most likely related to the point that the customer has to possible spent some money but, on the other hand, he saves a lot of money.*" (SI6), "[the customers] *have a much faster market introduction and much better perceived value proposition of Infineon.*" (SI7). With good supporting services, customers can be successful in their product development and, in the end, be willing to buy more products from Infineon. "*If we support our customers, technically wise, in a good way and our customers are earlier finishing their products, they start selling their products and the more and the faster they buy our products. It is an advantage for the both of us. Our customers are earlier in the market and we make revenue with those chips.*" (SI6).

Customer Satisfaction

To gather the customers' feedback and to measure the customers satisfaction on the services delivered, the department responsible for the customers' services does a satisfaction survey twice a year. According to the interviewees SI6 and SI7, the feedback is quite positive. "*Positive. Only positive. I have never seen a negative. Sometimes they are complaining about the Tools but the general saying is that our Tools are much better than what competition is doing. On services I only get positive testimonies from my people, that they are really thankful.*" (SI6). Besides the interviewees' point of view, it was possible to access the customers' satisfaction survey results. Due to the confidentiality of that information, there is no permission to share the results in this study. Nevertheless, it can be confirmed that the information on the customer satisfaction surveys matches with the interviewees statements. On the other hand, interviewee SI9 stated that sales doesn't measure the customer satisfaction and do not proactively asks for customer feedback but believes that customers appreciate the support given. "*We don't proactively ask for the feedback about the PSS. We had it in the supplier scoring for a while. We get sometimes some indications or sometimes the customer says "great support" or "we had a problem with a customer and we really appreciate the way you helped us there"… these kind of things. So, we get some qualitative feedback, not quantitative. We feel that the customers appreciate.*" (SI9).

Pricing Strategy

From the services groups presented, not all services have a price tag and not all are charged to the customers. The support, documentation and the production services are free of charge. The training, consulting, special measurements, software development kit and data sheets have a price tag based on market standards. The services pricing strategy is based on the standards in the market, meaning on value and not on cost. The choice to charge the services to the customers depends on the type of customer or on the person that is making the sell. The price tags for the mentioned services are not revealed due to confidentiality issues. "*Of course we orient on standards in the market. […] A price of something does not necessarily have to*

do something with the cost. The services are based on value." (SI6). The decision to place a price on the services came from the customer services department head. "*Something which does not cost anything, it's not worth anything. That means you have at least to put a price tag on it. Whether you give it for free or not, that's a different story but at least give it a value.*" (SI6). Interviewee SI7 provided a very similar statement, denoting that the management message on services is understood. However, the pricing scheme used for services do not cover the costs with it. The number of services currently sold (for which customer really pay for it) is not enough to have the business running and they still have to live from the product selling. "*I cannot sell so many services. We would not be able to carry ourselves on that… If I take my organization here, those people would have to be paid out of the services we get paid for… this does not work. For the Tools, yes, we have some margin on that but the services, if we have that one for free and some pay for this and that one… We have to live from the product sales. But we help to sell more products.*" (SI6).

The services can be shown to the customer or potential customers by the FAEs, by the AEs or by salespeople. In case it is a key customer, this has an own Infineon salesperson assign to it and the smaller customers may or may not have a salesperson to deal with it. In this case, an AE can take it and sell what is necessary. "*The largest accounts are handled by the Sales. We do not interfere. For the smaller customers, if they are asking for dedicated services, sometimes I don't even have a Sales guy for it…*" (SI7). The decision then to charge or not for any service depends on the person that is dealing with the customer. "*The decision to charge or not depends on the customer. If we have a dedicated salesperson, the decision is clearly on the salesperson. They make the package for the customer… in the end it's a Sales decision whether they charge, whether they do not charge, whether they calculate is on the price per piece or whatever… in which form factor they sell it.*" (SI7). As part of the customer services department, the AEs and the FAEs are aware of all the services that can be provided and, according on the department culture, they can look at current customers' needs and offer them the most suitable support service. Also, they always try to charge the customers for the service provided, taking also in consideration the necessary effort to be spent by the team. "*[…] at least we try to sell it to the customers. Sometimes we give it for free due to strategic reasons but at least we put a price tag on it.*" (SI6). Interviewees SI6 stated the surprise of people in other Divisions when he informed that he and his team were asking customer to pay for some services: "*I have talked to other people from other Divisions and what they say is that they couldn't believe that I'm selling training, that I'm taking money for the training and they said this is not possible for their customers.*" (SI6).

Usually, there is a salesperson assigned to a customer that decides if the services portion will be free of charge or not and usually the services provided for the key customers are not charged because it is considered that they will buy enough products to compensate any effort done to support them. "*We also know that if we do a training for …* [one key customer name] *we will have our return on our invest because once they decide they will set up a project to the end they will use it, they will buy big quantities of it, so we will have the respective expected turnover. So that is fine. If you have a new customer or a smaller customer, if we offer the training for free and at the end he is not buying anything from us because either he doesn´t manage to get the product running or he does not win the final project or he decides at the end to use the product from the competition… So, then you do the efforts for the training and this effort is not basically bringing any value. If a customer buys hundreds of*

millions of chips it is easier to get that back. Easier than the small customer that will only buy a few thousands of pieces." (SI9).

Economic Earnings

In general, the main economic earnings are coming from products but all interviewees considered that services can bring additional economic benefits to the organization. Services can help the organization sell more products and to have a faster sales cycle. If Infineon supports properly its customers, these will have their product finished sooner. "*Yes. By selling more products or even being faster in the sales cycle. When you start to discuss with the customer "do you want to buy from us?", the customer might have to do some work on it before he can use it and, the faster he is going to the finalization of his product, the faster we sell the product.*" (SI6); "*We have to live from the product sales but services help to sell more products.*" (SI7).

One interesting topic mentioned by interviewee SI8 was related to the price sensitive of semiconductors market. The products price decrease in average 5% to 8% per year and that the production costs decrease also but at a lower rhythm than the product price decline. If the organization sells the products at a lower price and the production costs do not reduce at the same rate, the organization profit will be lower every year. Through services and by charging the customers for these, the organization can increase its profitability or limit the price decrease by optimizing the price negotiations. "*Normally you have the pricing line… and the price is declining over time. This is the semiconductor market… between 5 to 8% per year. […] the productivity is declining, that means that the production cost declines. It means, if we have a higher productivity, our target costs are declining faster. And you see that the product price is declining faster than the product costs.[…] We sell them* [the customers], *for example, engineering expertise just to switch from one platform to the other. Then I don´t have to give them the whole price decline. […] at the end of the day implicitly we are generating a limit to the price decline. We can optimize these price negotiations.*" (SI8).

Regarding the profit and revenue already obtained with the services, it was not possible to access that information. The Business Line Controller was interviewed but this information was not available.

Sales of Services

- ✓ **External Communication**

When questioned about how a PSS is explained to the customers, interviewee SI6 said that he would focus on the services and that, on his opinion, the salespeople just focus of the products and consider services as a nice to have: "*Me personally, would focus on the services. Our Sales guys focus on the product, of course, and the services is just a nice thing around.*" (SI6). Interviewees SI7 and SI8 share the same opinion and, despite all attempts the customer services team have made to have salespeople explaining services and their value as well to ask customers to pay for them, most of them still overlook this message. "*That's what we try to teach our Sales guys, to our Key Accounts. Even if we do not bill our customers for the services and if they go into price negotiations, that they do not forget that we spent for a Key Account, 5 full people in the world, if you count for it.*" (SI7). It was said too that their product

focus make difficult for them to accept that services should be valued as well, despite having trainings on the existing services. "*I think it is a cultural challenge because we are a technically focus company. It's a cultural difference that we charge for the services that we offer to the customers or not. Since we are not doing the charging to our Key Accounts since a long time, it's always a challenge to educate, at least from our service oriented point of view, the Sales organization.*" (SI7).

Interviewee SI9 said that services are explained to customers on a case by case basis. The standard technical support (e.g. via e-mail or phone) is mentioned always as it is something that is somehow implicit with every purchase. "*It is not that I don´t mention it, we always let them know that they can have support. Anyways, technical support we have more than one Application Engineer available and the customer can call them any time they need. So that is a given.*" (SI9). The other services are offered in case it is verified that, during the project, customer faces some challenges and that existing services can help to overcome them. "*We are going to find out then during the year, during the projects, whether there are a lot of questions and if there is a part of our product that they haven´t understood and then we propose a training for example.*" (SI9). It was also mentioned by the interviewees that there is no indicator used demonstrate the value of services to customers. "*I don´t think that there is a clear indicator. I think that the customer experiences on itself […]*" (SI9).

The customer services team believes that is important to place a price on everything that is offered, even if, for any strategic reason, in the end the customer is not charged for the service, and that there should be no reluctance in asking the customer to pay for the services as long as their value is clearly shown so as any benefit for customer to use them. "*Yes, we try to explain that. […] You have to explain to the customer why it is worth this much. Otherwise, he will never pay for it.*" (SI6); "*The most important thing is to add a value to it. How does it worth? How I can help you? If I send one or two persons to the customer, this is an effort that can make him save one or two months. Doesn't have to read all the manuals, we train them, we give the experience that we have.*" (SI7); "*So, that means you can sell those stuff and you can add value to it. You just have to ask the customer.*" (SI6).

There is a clear difference between customer services team and salespeople to what it concerns showing the value of services and on to charge customers for them. The team makes all efforts to make sure the customers are supported in the best way and take a proactive approach in suggesting, for example, a training that could help to answer customer questions.

- ✓ **Challenges**

According to the interviewees, the customers typically expect to have the service free of charge, especially the key customers. "*As I said, the big accounts, the key accounts. They have more expertise. They like when we help them but they could live without us possibly. […]The big accounts expect the support for free.*" (SI6). Moreover, interviewees SI6 and SI7 mentioned that there are situations where these bigger customers paid for services. On their perspective, the success to profit with services is related with salespeople, whether they are open or not to explicitly show them to the customers and to explain their value and not so much if it is a big customer or not. "*I would state earning money from services is not directly correlated to the type of the customer. Certainly there is an indication that a large accounts will bargain with you to not pay for it, it's their nature. Nevertheless, the major part of the success where we earn something with the services or not, is related with the salesperson,*

whether they are open to try to gain some money for it or they just say anyhow, you are paid with the Cost of Sales and we are not a profit center were we have to earn money." (SI7).

It was mentioned also that salespeople focus more on the products and that they consider that only these will fulfill customer needs. The fact that customers are used to get the services for free and that salespeople are not used to ask customers to pay for them is one of the main challenges highlighted by all interviewees. The feeling was that there is some kind of fear that the relationship with customer can be jeopardize (so as future businesses) in case the salesperson tell the customer that now he needs to pay for a specific service. "*The main challenge is that the customer says "I have paid for the product, I don´t want to pay for the service". That is a general attitude. And then on the next step it depends on the relationship that you have with the customer and the time. If for ten years you have been offering trainings for free then it is difficult to come tomorrow to him and say "by the way, a training we consider as a service and services need to be paid, so in the future I will invoice you the trainings". That is difficult. That is always something you can try but it is always difficult if you are already in running business and have a relationship with the customer and you have been offering them for free in the past.*" (SI9). Sometimes these differences of acting are clearly visible, as it can be seen by the following statement from interviewee SI6: "*One of our big customers asked for a training. I said ok and told the head of that subsidiary the prices for the training. He said "yes, it's ok" and then I talked with our Key Account Manager for the customer and he said "Oh, you cannot do that.". I said "I already have the order". […] There are some people in Sales that I know they think of services and I have some others that come to me and say "I just gave some training for free. Is that ok for you?" and I say "No.". Sometimes the Sales guys get back on those decisions.*".

All interviewees mentioned that salespeople are not used to sell products but interviewee SI9 said that, in case services have also to be sold, additional training is needed to give them the necessary capabilities to do so as to change the people's mindset. Salespeople need to know how services work, what is the value proposition in order to be able to explain the customer their value add from the start. "*The sales force that we have in place is used to sell products and is not used to sell services. If we want to change that then we have to tell them, we have to give them the arguments, we might need to create a kind of sales package where we then show the value of the service so that you have arguments to discuss it with the purchaser on the other side.*" (SI9). On the training about selling services, this interviewee statement was "*If we want to sell services, then that's required. That is for sure required. First, we get the mindset right, so that all the Sales understand "I have not only to sell my products but I also have to sell my services". Second, to teach them the value proposition so that they can explain to the customer what the value is.*" (SI9). Interviewee SI9 agrees also that the way salespeople present services and solutions to a customer can be improved, by explicitly showing the services on any presentation, as it done for products, especially for the new customers. "*I guess so. Especially if we want to put more focus on the services and then we have to make it explicit. We have to show it. If we have a customer presentation, then we need a couple of slides on the product but also a couple of slides on the services. I think it is mostly required if you address new customers because the existing customers know our offer. The existing customers know how things work at Infineon but with the new customers there might be the opportunity to, from the beginning, show the services in a more explicit way and try to gain something with that. Yes, I could imagine you to address to your customer and say "I have this product with nice features and I have a worldwide technical support team. So if you need*

support, you can wherever you will do the development, doesn't matter where in the world, we always have someone in the same time zone, so you don't lose time, and so on and so on. But this has a price tag." We can build a slide where we then explicitly show the services that we have available, with the price tag on it." (SI9).

Purchasing people at customer have always the final decision but, if the services value is explicitly shown to the customer technical team, it might be that they can influence the Purchasing team decision. There are situations where that, even if the technical team likes the solution and want to have that, the buyers will look only for the lowest price and not to which kind of benefits the overall solution or the services can bring. "*The Purchasing guys are looking at the chip price. What they never see is how much support (technically) we give to the customer.*" (SI7); "*We try to talk to the Technical people and to the Purchasing guys. Then the Technical people can possibly influence the decision a bit but finally Purchasing is doing it. They are not the decision makers but they can influence the decision somehow. The more channels you have into a customer, the better is and juts to have influence in different areas.*" (SI6). Nevertheless, it was said that having an overview of the services provided to a customer can be helpful in future price negotiations and avoid major price reductions. "*For one of our key accounts, I found at the end of the year that we spent, in number of hours and people, like […] thousand euros for support. Then I gave that number to the Sales guy and said "maybe you can use this." And next time he went to the Purchasing and was negotiating the products prices… the Purchasing started saying that the prices from the competition were lower and the he had to decrease also. And our Sales guy said "do you know how much we spent for you in support worldwide? And the Purchasing guy said "let me think. Yes, there is some value" and did not insist more on the product price reduction.*" (SI6).

4.4 Cross-Case Discussion

Previously on this chapter, each case study was presented in the form of a narrative description. The purpose of this section is to provide the results based on the similarities and differences found within the case studies. The findings will be simultaneously related with the existing literature. In the end of each topic of this section there will be a table with a summary of those similarities and differences, being complemented with the relevant data from the unstructured interviews whenever possible.

Products and Services

Infineon offers its customers a mix of both products and services. The products are considered to be complex and the services have always been provided with the product, aiming to guarantee its correct functioning so as to assist customers in their design (customize customer design around Infineon products). Some examples of the services enunciated by the interviewees are the technical support, training, reference and board design. The organization can also perform some testing, simulations or measurements on customer behalf. The number of services is somehow high, supposing that the complexity of market and customers' demands is also high (Gebauer et al., 2009). The services can be provided worldwide by FAEs or AEs.

The services delivered by Infineon can then be classified as services that support the suppliers' product, (Mathieu, 2001a). Linking with Tukker (2004) services categories,

services can be classified as product-oriented services: the organization offers services that are necessary through the use phase of the product and offers advice on its most proficient use but the main goal is still the sales of products.

The product-service continuum (Oliva and Kallenberg, 2003) describes that first services are seen as a supportive function and, while moving to the right side of the continuum, services are considered as a central part of creating value and as an essential element for growth. Infineon can be placed at left side of the continuum as it mainly produces core products and, in general, services are seen as an add-on that enhances the value of the product.

Table 4 - Similarities and Differences: Products and Services

Subtheme	*Similarities*	*Differences*
Products and Services	Complex products; Services that support the product.	-

Competition and Differentiation

The results show that the competition offers similar products, denoting that Infineon products might not have as much differentiation as thought since products can be physically comparable. Within the organization, products and their features are still understood as relevant factors in differentiating the firm from the competition but the importance of services is starting to be understood as a mean to differentiate in the markets. To thrive, a product dominant company needs to find ways to distinguish themselves from their competitors and the respondents consider that it is possible for the organization to achieve competitive advantages through services. As products can be physically comparable, adding services to them might be the only way to achieve differentiation (Frambach et al., 1997).

The markets are changing rapidly, new and more complex products are being developed and delivered and the need for engineers' expertise to assist customers to work and design around those products is increasing. The importance of services in the industry is increasing as well. When choosing a supplier, the customers do not look only at the product features but also to the past experience with it, the quality provided on both product and services so as on the technical support, being the services part of the whole offer that makes customers considering working with Infineon.

With the current services available, Infineon shows that it has the know-how and sometimes exclusive expertise to assist the customers promptly and the high quality of the services provided is perceived and valued by the customers. According to Oliva and Kallenberg (2003) services are more difficult to imitate as they are less visible and more labor dependent, becoming a source of competitive advantage. On the other hand, if Infineon and competitors' products have similar features, the high quality services can then be a mean to add more value to them. Besides being a mean to respond to customer needs, services can as well be considered as a way to differentiate the manufacturers offering from the competitors, helping to retain old customers and obtaining new ones (Mathieu, 2001b; Brax, 2005; Gebauer et al., 2008b; Brax and Jonsoon, 2009).

Table 5 - Similarities and Differences: Competition and Differentiation

Subtheme	*Similarities*	*Differences*
Competitors	Competition offers similar products.	-
Differentiate Through Services	Services as a mean for differentiation.	-
Quality of Services Delivered	High quality of services delivered.	-
Importance of Services	Importance of services in the industry is increasing.	-

Organization Culture

The strong product centric culture of the organization and the high focus on key customers appeared several times on both CSI and CSII so as on the unstructured interviews. Infineon culture focuses on the core product and aims to develop new products by leveraging technology or expert skills that exist in the organization and services are mostly considered as an add-on. Also, people focus mainly on the bigger customers as it is considered that these will bring a more benefits to the company. In such a culture, value is determined by the producer and services are seen as add-ons or as an unprofitable necessity to sell products, being the customer role of just a receiver (Oliva and Kallenberg, 2003). It was emphasized too that changing the strongly product mentality that underlines the organization strategies, practices and processes would be a challenge. This can be seen on both cases presented, where the data identifies the existence of an enormous resistance of people within organization to accept the charging of services. The strong product mindset makes them to consider that only products matters to customers and services are a “necessary evil” to sell products. On the opposite, it can be denoted the presence of a more customer oriented and service culture on CSII mainly due to the existence of a separate customer services department in the business unit and its management conviction on services value add. A culture of serving the customer and looking after its best interest is consciously cultivated by the customer services department management, contrarily from what seems to be happening in the rest of the organization. Brax (2005) defines that an organization should re-focus its attention when setting up a service oriented organizational culture. On CSII it can be seen that there is the intention to extend the change of mindset to all functions in the company (e.g. engineering, sales) and this is stimulated by raising the change on the perception about services but also by having the department management demonstrating commitment on that change. The servitization demands a change in employees’ mindset and this modification should be stimulated by managers, requiring a solid internal marketing based on an enhanced understanding of customer benefits from services (Gebauer et al., 2006).

Table 6 - Similarities and Differences: Organization Culture

Subtheme	*Similarities*	*Differences*
Culture	Product centered culture (CSI and on the overall organization); Resistance to accept the sales of services; Services seen an add-on (organization).	More customer oriented culture (CSII).
Focus on Key Customers	High focus on key customers.	-

Organizational Configuration

Generally, Infineon is organized around products categories, where employees attend to their own products. In order to provide the services, the organizational structure on CSI was not adjusted to meet the demands of the new business model and to accommodate the requisites and challenges that the new PSS would bring. It was also verified that the existing system do not permit selling services and people have adapted to this technical configuration instead of changing it to include the new services. This makes the organization provide an unclear overview of what the offering contains and internal employees and customers cannot truly differentiate the services from the product. The absence of experience in dealing with integrated offerings, on how to provide services in such model so as the strong product centered culture may possibly explain the reason to keep the existing organizational structure and technical systems. The goal is still to sell products and services around would not be considered relevant enough to rationalize any change.

Contrasting, the business unit in CSII has set up a separate department for the customers services some years ago. This department is responsible for the development and delivery of the services offerings, so as for their pricing definition and can even sell the services to customers that do not have an Infineon salesperson allocated to them. This makes the business unit to move away from the manufacturing centered structure to a more customer centered one, to support the customer and a service oriented culture so as the implementation of a service strategy decided by the department management. Brax (2005) indicates that if a business unit desires to servitize, it should have a customer centric configuration to allow the employment of a service strategy and sustain the service oriented culture. It is considered advantageous to have separate SBUs for services as a way to fully control the targeting of customers and for the development, pricing, selling, and delivery of service offerings (Gebauer et al., 2010d). In case of CSII, there is no separate SBU but a separate service department focused exclusively on services and which acts also as the organization's face to the customer. The individual department for services shows that these employees are able to have an enhanced understating of how to provide these and appropriately learned how to value, sell and deliver services, in contrast to CSI. Despite the initial and continuous effort of the development team to value services, the individual functions (e.g. sales) so as the business unit management still keep the product thinking and do not show an effort to apprehend how to integrate the services in the offering and daily operations, still considering them as an add-on. Gebauer et al. (2010d) study on the impact of different organizational structures expresses that an integrated service organization restricts the construction of a service orientation. As the integrated service unit would be created within the product oriented values, there might be clatters between the leading product culture and the evolving service oriented culture, which could possibly obstruct the development of a service oriented culture. By separating services and products, the service culture might become stronger, as it happens on CSII.

Table 7 - Similarities and Differences: Organizational Configuration

Subtheme	*Similarities*	*Differences*
Structure, Processes and Technology	-	No change on current organization structure or processes to deliver services (CSI); Existing system does not allow sales of services (CSI); Existence of a customer services department (CSII).

Design, Development and Delivery

According to the results, in general there is no clear design and development process for services as it happens with products, something that has been identified as important for new services development (Gebauer, 2006). By only focusing on the product and its features, the products are developed and only after the services component is thought as a result of customers' needs and requests. What happened at CSI visibly exemplifies this situation: the product was developed and released in the market. There was no organized service development process and, after receiving numerous requests for support and realizing that there were no more AEs and FAEs available (this support was being provided free of charge until then), the team identified a profitable service opportunity, illustrating that the new offering was not well understood. This goes in hand with Martin and Horne (1992) statement that the services development process is often unstructured and just goes behind the product development as manufacturers consider service innovation as something that "just happens".

Also at CSI, no customer was involved on the services design and development process. The customers' needs were assumed according to data coming from the AEs and FAEs. However, the information gathered was considered only for the product design and not for services. In the end, the team had to rethink the whole support and possible services to be able to meet the customer needs. On CSII, it can be verified an opposite approach. Here the services are considered from the beginning of the design of a product as the elements of the customer services department are involved in the process but the situation is not yet ideal because development teams needs to be constantly challenged as they are used to think on product only. The feedback from the AEs and FAEs about the identified customers' needs is also usually taken to the product development teams so that these can be considered in future projects. Certainly, development teams require inputs from service staff to be able to design products that are more service adjusted and service team needs input from the development people so that they are capable to design services that meet customer needs and to ensure product functionality. The customer input should be taken into the development process and these to be co-created with customers, leading to a higher satisfaction, to strengthen customer loyalty and, consequently, the firm profitability (Zeithaml et al., 2014).

It can be indicated that the overall organization does not have a structured and formal service development process and did not embrace a new customer perspective where it could identify and understand customers' needs even when they cannot recognize the essence of their problem (except for business unit on CSII). It is required to understand the customer processes, be responsive to customer requirements and meet the demands of the customers' business environment (Martin and Horne, 1992). The firm should, as well, take customers inputs into the service development process and design services together with customers as a mean to create better solutions, increase satisfaction and loyalty.

On both CSI and CSII, partnerships to develop and deliver the services were set up. This is due to missing expertise or manufacturing capabilities but can be seen as well as a mean to facilitate and reduce the risk of undertaking servitization.

Training on services and solutions is provided to people involved on their delivery. However, is quite interesting to see that, on CSI, salespeople statements regarding the training on the developed PSS and its service model does not match with development team reports: salespeople say that they didn't attend any training while team said that everyone received training. This demonstrates a lack of communication between the development team and the

salespeople. The missing experience in the development of services models, the profound product centric culture and the missing adjustment of the organizational structure to embrace services can be some of the reasons to explain this deviation on the statements. The people did not recognize that an enhanced communication is a crucial activity to make the services understood in an overall way and to promote the holistic view throughout the organization, as highlighted on studies from Gebauer et al. (2006) or Mathieu (2001b).

One weakness mentioned was related with the resources needed to deliver the services to the customers. On CSI, it was said that engineers are tied up with the services provision and may not be assigned to other tasks or be involved in new products development. The product centric thinking and the goods oriented structured made them to no adjust the personnel to meet the demands of the new business model. This denotes that people continue to consider the products more important than services and solutions, indicating that services are competing with products for the corporate resources (Zeithaml et al., 2014). On CSII it was also mentioned the resources challenge but on the perspective that not enough services are sold to customers to allow having the department surviving on the profit obtained from that.

Table 8 - Similarities and Differences: Design, Development and Delivery

Subtheme	*Similarities*	*Differences*
Service Design and Development	No clear design and development process for services (organization).	Services not considered in the product design and development phases on CSI while are on CSII; No experience in designing and developing services separately (CSI); Assumption of customer needs on CSI.
External Involvement	Partnership for the design, development and delivery of services.	Customer not involved on service design and development (CSI).
Internal Communication	Training setup.	Salespeople claim to not have training (CSI).
Weaknesses	Resources needed to deliver the services.	-

Value Proposition

On both CSI and CSII, the value proposition of the services is characterized by providing a faster time-to-market and cost benefits to customers. Essentially, with the services available, Infineon is able to assist customer to have its product available sooner than the competition so as to decrease its operations costs. It was highlighted that usually value proposition is not comprehensively thought and this can be shown with CSI where, for example, the services were only considered after the product release in the market and the benefits that these could possibly bring to customers and Infineon should have been identified in the beginning.

Providing value is the principle of making a product or service lucrative and, when selling services, the significance lies in understanding what customers consider valuable (Neely 2008). At Infineon, the value proposition of the product is based on its specifications. However, when services become to be part of a company offering, the overall offer and how it is presented to customers has to change (Neely, 2008). The two case studies show, for

example, that it is possible to have customers paying for a service by explaining them the potential benefits that they can have. However, there is no clear indicator to show those benefits. The value proposition of services is not obvious to customers because it was not completely transformed into something tangible or measurable, so that it can become more understandable for the customer. So, despite the clear acknowledge of the benefits for customers by Infineon people, it seems there is a challenge for the company on how to express the value proposition more effectively, showing difficulties in providing the service with a convincing value proposition that would justify the price and persuade customers to pay for them. It is necessary that the organization educates its customers, partners and salespeople about the benefits to both customer and provider. The organization should improve the understanding on what value means to customers and emphasis its services offers on the value proposition to them. A measurable value proposition can simplify the comparison of benefits and price and can be used as selling argument by the salespeople (Gebauer et al., 2005; Neely, 2008; Neu and Brown, 2005).

Table 9 - Similarities and Differences: Value Proposition

Theme	*Similarities*	*Differences*
Value Proposition	Value Proposition: faster time-to-market and cost reduction; No indicators to demonstrate the value of services.	-

Customer Satisfaction

The results demonstrate that the customer feedback on services is not formally collected on CSI but the perception the team has is based on opinions the customers are providing to the AEs and to FAEs. On CSII, the customer feedback about the services delivered is collected as well from AEs and FAEs when directly dealing with customers but customer satisfaction is properly collected with a survey done twice a year by the customer services department. On both CSI and CSII, salespeople do not actively or formally ask for customer feedback on services. Despite that, it is possible to verify that, in general, services have a high quality, that customers really appreciate them and that are too aware of their quality. Customers commonly contemplate which services an organization can offer before making purchasing decisions. The level of quality of the services is a driver for long-term relationships and to preserve ongoing connection (Mathieu, 2001b).

Value is what customers look in an offer and customer satisfaction is an inner view, resulting from their own experience with the service. Realized value in the form of value-in-use is created during consumption (Grönroos, 2008) and being able to provide value is the essence of making profitable any service (Neely, 2008). Through the collection of customer feedback, the team is able to better understand the customer requirements and to adjust their offering to customers demands, contributing to the enhancement of the new services development process.

Table 10 - Similarities and Differences: Customer Satisfaction

Theme	*Similarities*	*Differences*
Customer Satisfaction	Customers satisfied with services; Customers aware of the services quality.	Customer feedback collected and customer satisfaction measured on CSII but not on CSI;

Pricing Strategy

The price of the products and services on CSI is presented bundled and the products and services of CSII are individually priced. The customer services department management believes that services should always have a price tag even if customer is not charged for them. Oliva and Kallenberg (2003) denote that standard and unbundled services are provided to start on the service business in the first stage of servitization.

Traditionally, Infineon defines the price of the products by taking the cost plus a chosen profit margin but, as there is no habit to separately charge customers for the services, most of the times Infineon products and services pricing is bundled (a global price for products and services). As per Ulaga and Reinartz (2011) this approach is usually taken to avoid pricing questions. On both CSI and CSII there is an attempt to move way from what is standard at Infineon and the results show that services have a value-based pricing strategy, in opposite to the cost-based pricing for the products. The services are priced according to the standards in the market and on what customers might be willing to pay for. For Hinterhuber (2004) and Nagle and Hogan (2006) the pricing should be proportionate to the value created for the customers, being related to the value impacts on the customers' business rather than calculated based on the service cost (Oliva and Kallenberg, 2003; Gebauer and Friedli, 2005).

Johannsson et al. (2003) considers the value-based pricing strategy as the most appropriate for services. This method can be very profitable in markets where the firm can offer premium services that are extremely valued by the customers. As mentioned, the customer feedback on services is quite good and they are aware of the service quality, being valued by them. Furthermore, pricing services or integrated product-service offering properly is imperative but it has been a challenge to Infineon. There is no previous experience in pricing services, in create and communicate an effective value proposition of services that would explain the price and convince customers to pay for them. The organization should make all efforts to overcome the existing obstacles and perhaps start by educating the customer and the sales team that services are chargeable and not free and clearly transmit that the price of the solution reflects the value that product and service together create (Gebauer et al., 2005; Neely, 2008; Neu and Brown, 2005).

It is, as well, possible to verify that there is no consistency concerning billing customers for the services. On CSI, despite the existence of a service model and categories, the key customers do not pay for the services but only for the products. A similar approach can be found within CSII: customer services department consider that everything should have a price tag and try to ask customers to pay for the services whenever possible but the type of customer can also influence their decision. In general, salespeople do not ask customers to pay for the services, especially the key customers. It is consensus among all the inquired to consider this approach as a strategy decision to increase customer loyalty and that bigger customers will buy enough products to compensate any cost with the services. However,

according to Witell and Löfgren (2013), not charging a customer for a service does not necessarily lead to a loyalty increase effect and free services that do not have value to the customers have no purpose.

From the empirical data, there is an indication of the possibility for the organization to develop a strategy where more services are being charged. The interviewees pointed out that customers are open to pay for the services but that it is important to clearly express the value of the offering to them. Kapil et al. (2007) say that by stressing the value rather than the price of a service, the selling process can be facilitated.

Table 11 - Similarities and Differences: Pricing Strategy

Theme	*Similarities*	*Differences*
Pricing Strategy	Cost-based pricing strategy for products; Value-based pricing strategy for services; Key customers not charged for the services.	Management believes that services should always have a price tag (CSII).

Economic Earnings

The profits and revenue are mainly generated through the company's products and the contribution of services to these is low. Even with the high focus on products and considering that only through these the organization gets the profit and revenue, the respondents contemplate that services can contribute to the sales of products (services help to sell more products) and can be a mean to obtain extra profits and revenue. Oliva and Kallenberg (2003), Gebauer et al. (2006) and Gebauer et al. (2008b) mention that services have higher margins than products and provide a more stable source of revenues as services are more resilient to the economic cycles and that help also to sell more products.

The prices of products on semiconductor industry seem to decrease an average of 5% to 8% per year while the production costs decrease at a lower rate. This means that the profit the organization is obtaining with the product selling is declining over time. Services can then be a way to reduce that delta between the price and the production costs, contributing to an increase of the overall profitability. Gebauer et al. (2009) denote that services can be a compensation for decreasing product margins. It is also seen that, even if services are not charged, that the products price negotiations can be optimized (by limiting the price decrease) if there is a clear indicator to show the benefits of services and the costs savings for customers.

For both cases, there was no information on profit and revenue of services. However, Mathieu (2001) says that, in order to recognize the financial benefits from a servitization strategy, the organization needs to have a precise measure of the costs related with the delivery of services and, at the same time, being able to adopt the proper pricing strategy.

Table 12 - Similarities and Differences: Economic Earnings

Theme	*Similarities*	*Differences*
Economic Earnings	Main economic earnings coming from products; Services seen as a mean to earn additional profit and revenue; No information about services profit and revenue.	-

Sales of Services

Despite the tradition to not have customers being charged for the services, there is a general belief within organization that customers are not willing to pay for services. But salespeople do not ask customers to pay for it. They show a high hesitation in doing so, thinking that this action will somehow threaten any future negotiation. There are situations on CSI and CSII where an AE or a FAE informed customers about the price of the service and asked them to pay for it and they were able to get a positive answer from them, contradicting the salespeople and other internal employees' assumption. These get to be more familiar with customers' processes and attain selling opportunities when customers ask for upgrades or modifications. On the other hand, salespeople might be missing the possibility to identify a profitable service opportunity and selling opportunities just by not being open to recognize the added value of services and by not communicating properly the value proposition. Salespeople need to be convinced of services' potential and they should understand that communication is vital to transmit the benefits of the service offer to customers (Brax, 2005; Mathieu, 2001b).

Salespeople resistance to services was a challenge identified on both CSI and CSII. It seems that salespeople do not perceive the added value of selling services and thus do not actively promote them. In general, the products characteristics are still used as a selling argument across the salespeople and, in the promotion of the product-service offering, product and technical excellence still play a major role. Salespeople in manufacturing companies are usually trained in cost analysis and to highlight the technical features of goods (New and Brown, 2005). Thus, the salespeople at Infineon demonstrate missing capabilities to sell services and solutions and this traditional sales force will be ineffective in selling those without the proper skills to comprehend and meet the customers' needs. Training in communication, problem solving, flexibility and adaptability are necessary for salespeople to be able to listen to customer and to customize solutions based on its needs (Sharma, 2007; Ulaga and Loveland, 2014).

One of the challenges mentioned in selling the PSS on CSI was the paperwork needed to have a deal with customer. There was the need to develop new contracts between Infineon and the customer for the successful delivery of the PSS, which are no longer based merely on the sale of products but that incorporate the service component of the offering. Both customers and salespeople are not used to this required documentation and are still trying to adapt to this new situation.

From the results it was also possible to identify the customer purchasing people focus on price as a one main challenge for Infineon to sell services and solutions. It is assumed that these just aim to bargain the price of the product and to get the lowest one and do not care about which services are provided (even if free of charge). However, the example on CSII where the salesperson took an overview of the services provided free of charge into the product price negotiations and then the purchasing person did not ask for an additional price negotiation can somehow contradict that assumption. Though, despite the effort from the team to prepare and present some benefits of services, this was simply one situation and there is no common practice to use this approach. As stated previously, there is no clear indicator to show the benefits to customers and that value proposition is not clear to customers because there is nothing tangible to present. Due so, it can be determined that Infineon does not explicit the services on the solution provided and that there is an opportunity to improve the customer value by explaining and appreciate more the services component. Kowalkowski (2011) states

that customers have different stakeholders at negotiations, each one with its own sense of value. A value proposition that underlines value-in-use is better positioned to contemplate the needs of the several value evaluators.

Table 13 - Similarities and Differences: Sales of Services

Subtheme	*Similarities*	*Differences*
Challenges	Customers not used to pay for services; Convince customers to pay for services; Salespeople not used to sell services; Salespeople hesitation to ask money for services; Buyer Purchasing people focus on price.	Paperwork involved (CSI).
External Communication	Value of services not clearly shown to customers.	Customer services department makes an effort to show the value of services (CSII).

4.5 Main Findings

Based on the objectives defined for this study and on the research findings, an answer to the research questions will be provided as follows:

1 - How can the organization potential to develop a servitization strategy be characterized?

Infineon has integrated solutions of products and services and is in a very early phase of moving into the service business. The offerings focus mainly on products but the number of services and their heterogeneity is somehow high (e.g. consulting, design and development, simulation, support, production, etc.) leading to the supposition that the complexity of the market and of customers' demands is also high (Gebauer et al., 2009). The products that the organization offers are quite complex and customers constantly request the engineers support to primarily do the design around them. So, services are always needed to be provided together with the complex products. It was also recognized that Infineon engineers have a high degree of qualification and expertise for the provision of services and that these can be delivered anywhere in the world. However, an interesting perception of this study is that a small part of the organization is getting ahead of others in becoming more service-oriented. One of the business units has set up an individual customer services department, people are becoming to be aware of the services value, contributing to the start of a dissemination of a more service and customer oriented culture. They are impacting as well the product development process by recognizing that services have to be thought from the beginning and that not only product features are considered, demonstrating that it is possible for the organization to consider developing a servitization strategy within the overall organization.

There is a significant potential for the organization to develop a servitization strategy. The importance of services in the industry is increasing and Infineon already provides services on the daily business, even if on an unconscious and non-strategic way. The customers want to have Infineon services and also need them to use the complex products. The two cases on this study show that it is possible to move towards a more service oriented approach as a mean to differentiate, to meet customers' needs and to obtain additional economic benefits, despite all the challenges faced.

2 - Why should the organization consider developing a servitization strategy?

The markets are becoming more complex with customers demanding further customized and broader scopes of services and the increasing global competition has created opportunities for services as value adding components for the customers (Brax and Jonsson, 2009; New and Brown, 2008). Based on the literature and on the research results, some factors for the organization consider developing a servitization strategy were identified.

For the financial drivers, the organization should consider that services can be a mean to compensate the decreasing product profit margins. The product price decreases every year at a higher rate than the production costs. By selling services, the decrease on the product profit margins can be compensated and the overall organization profitability might increase. Relating with Mathieu (2001b) study, it is suggested the organization to set up a clear pricing strategy for services to be able to access the expected financial benefits.

On the strategic drivers, it can be recognized that there is an opportunity to have a better differentiation and competitive advantage. Infineon competition is strong and offers similar products but services are a good approach to enhance product differentiation as they are more difficult to imitate (Oliva and Kallenberg, 2003). With the identified benefits of services (faster time-to-market and costs reduction) there is as well an opportunity to help customers to be more successful and to improve their business processes. However, it is recommended that Infineon creates an appropriate value proposition for the services and to develop solutions based on the value-in-use defined by the customer according to the perceived benefits of the services and solutions. The value of services should also have clear and tangible indicators so that customers can effectively apprehend those benefits.

It is possible to denote also that, despite the focus on key customers, it is the smaller customers that might need more the services offered by the organization. There can be seen an opportunity for Infineon to contribute to the customers growth and consequently grow as well (the proportion in which these customer could grow could be higher than what a key customer grows nowadays) and would be able to lock in customers by establishing a closer relationship with them and by creating dependencies, to increase customer loyalty and differentiate from the competition.

On the marketing drivers, it can be recognized that the results show that the high quality of the services provided help to sell more products, going as well towards Gebauer et al. (2006) and Gebauer and Fleisch (2007) studies. Customers are quite satisfied with services provided and are aware of their quality, contributing to the customer purchasing decision and to build customer loyalty.

3 - Why could the organization be prevented to develop a servitization strategy?

Infineon has to overcome a set of challenges in order to be able to provide integrated products and services.

The organization has a solid product centric mindset and, in general, there is no individual service design, development and delivery system. The design and development of a solution considers mainly the product features and services are usually sought after that process is finalized. The product thinking is always present, not always allowing services to be thought as something that can bring value to customers. Frequently, services are not created in a strategic and conscious way, impacting the definition of the offering value proposition and its

communication to customers, denoting that customers might not properly understand the benefits of the solution provided. For these reasons, the task to convince customers to pay for the services and solutions is considered a challenge. It is suggested Infineon to surpass the strong view of the product and to create a cohesive system to develop and deliver the services in a conscious and strategic manner. It should consider that a balance between product features and services is required as well as to have a better understanding of the capabilities of the organization to deliver the most suitable product-service offering. Moreover, it should make all efforts to include customers on the design of integrated solutions and to collect their feedback on a formal and structured way so that it can better understand their needs. Likewise, the management should express its commitment on any change and implement an internal communication of the value of services so that employees recognize the benefits that these can produce. These actions can contribute to the development of solutions that will fully meet customer needs and consequently to assist on convincing them to pay a higher price for the value that an integrated solution can bring.

The organizational structure is not set to contemplate the services stipulations and can be as well a challenge to develop a service strategy. From the research results, it can be seen that to have a separation between services and products contributes to the construction of a service and customer orientation. The organization should consider to establish a separate unit for services to allow the implementation of a service strategy and support a service oriented culture, as the findings of this research and Brax (2005) study suggest, but also to avoid failing to exploit entirely the opportunities services can provide (Gebauer et al, 2005).

The services value is not effectively demonstrated in the selling process. The organization has a long tradition of manufacturing and selling goods and so salespeople do not feel comfortable to sell services. They show a high hesitation in asking customers to pay for the services and their focus is mainly placed on product technical functions rather than on efforts to express the value of services. This indicates that salespeople are not adequately prepared to sell services and integrated offerings and that they are not able to communicate the value of the services and solutions in order to justify their price. Training on services and on services value should be provided to salespeople in order to reduce their uncertainty when selling services and to learn how to communicate the value of the service and solutions to customers. Also, despite the general statement that services allow customers to have a faster time-to-market and to reduce operations costs, the value proposition is not clearly expressed and it is necessary that the organization develop measurable indicators for the services and to effectively express their value, so that their benefits are evident and properly apprehend by customers.

Commonly, at Infineon, products have a cost-based strategy but the price of services is not define because these are usually bundled with the product and not charged to customers. The organization needs to understand that offering the services free of charge does not necessarily increase customers' loyalty, as suggested by Witell and Löfgren (2013). This study findings show that, whenever needed, the value-based pricing was the strategy taken for services. It is advised that the organization takes this as example when considering in develop a servitization strategy and to have a pricing that reflects the value that products and services create together and to provide tools for the employees to charge the customer for the services delivered. By doing so, the emphasis can be placed on the value that the integrated solution provides rather than on its price.

5 Conclusions, Limitations and Implications for Future Research

General Conclusions

This dissertation has as main subject the servitization in manufacturing firms and aims to understand the potential that Infineon has to develop a servitization strategy and to recognize the drivers that could lead the organization to follow that strategy and the barriers that could prevent the development and implementation of a servitization strategy. In order to reach those objectives, three main research questions were defined and a multiple case study research was done at Infineon. Through a cross-case analysis and the relation with the servitization literature, it was possible to answer the research questions and to meet the objectives proposed for this study.

It was possible to verify that Infineon already provide a variety of services to its customers but that these are created and delivered in an unconscious and non-strategic manner, being considered as something implicit with ever product. On the other hand, the relevance of services is increasing in the semiconductor industry and Infineon customers request them in order to be able to use the complex products.

The identified factors for the organization to consider developing a servitization strategy are aligned with the drivers discussed in the literature review. The main benefits that Infineon could have by adopting such strategy can be categorized as well in financial, strategic and marketing. It can be concluded that Infineon could use services as mean to compensate the product profit margins decrease, to better differentiate from the competition and to gain competitive advantage and use services to sell more products. It was possible to denote also there is an opportunity lock in the smaller customers and with more needs in terms of services and to create dependencies with these.

From the results analysis, it was possible to identify the organizational culture and configuration, the services development and delivery process, the pricing strategy and the sales capabilities as the main challenges for the firm to develop a servitization strategy. In the literature review of this study, it was observed the existence of several challenges in servitization, generally related with integrated product-service design, organizational strategy and organizational transformation, being possible to verify that Infineon faces the same challenges as discussed in the literature. Infineon should internally disseminate the value of services, so that the product centric mindset can be overcome and to create an organized system to develop and deliver the services in a conscious and strategic manner. The management ought to show a commitment with a service approach and an internal communication of the value of services must be provided. The organization structure should be adapted to support a servitization strategy and a service oriented culture, by focusing on customer and not on products categories. It is requested as well that the firm develop a pricing strategy based on the value that products and services create together. Also, salespeople capabilities should be adjusted to the sales of services and training should be provided so that they are able to clearly express the value of services to the customers. At the same time, it is necessary that the organization develops a measurable value proposition to assist salespeople task of selling services and in communication their value to customers so that they can better understand their benefits.

From the research results, it can be concluded that the organization has the potential to develop a servitization strategy and that it will have quite a few benefits in doing so, as long as the identified challenges are overcome.

Despite the variety of studies of PSS, servitization or service infusion being relatively high, it was possible to denote the absence of studies about services in the semiconductor industry during the research period. The results of this study can contribute to the knowledge on what can influence the development of a servitization strategy and to establish the servitization concept in this practical field. The results have as well managerial implications for the manufacturers. This study demonstrates what other manufacturing companies might be currently experiencing and the expected contributions of this research are to rouse the interest of enterprise managers to identify and quantify profitable service opportunities and improve their understanding of the benefits of value creation through services. It is also expected to demonstrate the need for the management to create an organizational environment in which a service culture and service orientation is established and where the value of services is internally and externally demonstrated to successfully develop a servitization strategy.

Limitations

One of the limitations of this research is that the study focuses only on a manufacturing company in the semiconductor industry, being the findings limited to this sector. Although the findings could perhaps be applied to similar industries, there is uncertainty about its application for other manufacturing services.

Another limitation is that only an internal perspective was taken for this research, concentrating on supplier side of service infusion as there was no permission to contact customers to obtain their point of view. Some external challenges might not have been covered and a study including as well the customer perspective could have provided further insight into the servitization process.

The number of respondents is this study could also be defined as a limitation. It is considered to be relatively low. It would have been interesting to have additional interviewees in each one of the case studies selected to validate further the quality of the study.

Implications for Future Research

This study focuses in just one company in the semiconductor industry. It could be interesting to extend the study by increasing the number of sampled firms and by, using a multiple case study research method, to verify their current service infusion situation and their approach towards services to obtain a competitive advantage and create value to customers.

One of the limitations mentioned for this study was that it took only the supplier’s perspective. Due so, one opportunity for future research could be to further develop the study by including as well the customer perspective to provide additional insight on the organization servitization process.

Furthermore, as not all the business units of the organization were considered in this study, it would be suggested to enlarge the scope of the research to include the other business units to acquire new insights on the servitization approach, taking in consideration the individual characteristics of the different markets, products and customers in each business unit.

References

Baines, T.S., Lightfoot, H., Benedettini, O., Whitney, D., Kay, J.M. (2010). The adoption of servitization strategies by UK-bases manufacturers. *Journal of Engineering Manufacture*, Proc. IMechE, 224, Part B;

Baines T.S., Lightfoot H.W., Benedettini O., Kay J.M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20(5): 547-567;

Baines, T.S., Lightfoot, H., Steve, E., Neely, A., Greenough, R., et al. (2007). State-of-the-art in product service-systems. *Journal of Engineering Manufacture*, Proc. IMechE, 221, Part B;

Barquet, A. P. B., de Oliveira, M. G., Amigo, C. R., Cunha, V. P., Rozenfeld, H., (2013). Employing the Business Model Concept to Support the Adoption of Product–service Systems (PSS). *Industrial Marketing Management*, 42(5): 693–704;

Brax, S. (2005). A manufacturer becoming a service provider-challenges and a paradox. *Managing Service Quality*, 15(2): 142-155;

Brax, S., Jonsson, K. (2009). Developing integrated solution offerings for remote diagnostics: A comparative case study of two manufacturers. *International Journal of Operations & Production Management*, 29(5): 539-560;

Carter, S., L. Henderson (2005). *Approaches to qualitative data collection in social science. Handbook of Health Research Methods: Investigation, Measurement and Analysis.* 1st ed., Berkshire, United Kingdom: Open University Press, McGraw-Hill Education, 215-230;

Creswell, J. (2007). *Qualitative inquiry and research design: Choosing among five approaches*. 2nd ed., Thousand Oaks, California: Sage Publications Inc.;

Doering, R., Nishi, Y. (2008). *Handbook of semiconductor manufacturing technology*. 2nd ed., USA: Taylor & Francis Group, LLC;

Eisenhardt, K. (1991). Better stories and better constructs: the case for rigor and comparative logic. *Academy of Management Review*, 16(3): 620-627;

Eisenhardt, K. (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14(4): 532–550;

Eisenhardt, K., Graebner, M. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, 50(1): 25-32;

Edvardsson, B., Gustafsson, A., Roos, I. (2005). Service portraits in service research: a critical review. *International Journal of Service Industry Management*, 16 (1): 107-121;

Fontana, A., Frey, J.H. (2005). *The interview: From neutral stance to political involvement*. 3rd ed., Thousand Oaks, California: Sage Publications Inc., 695-728;

Fortin, M. (2003). *O processo de investigação da concepcão à realização*. 3rd ed., Loures: Lusociência;

Frambach, R.T., Wels-Lips, I., GuÈndlach, A. (1997). Proactive product service strategies: an application in the European health market. *Industrial Marketing Management*, 26(4): 341-352;

Gebauer, H. (2008). Identifying service strategies in product manufacturing companies by exploring environment-strategy configurations. *Industrial Marketing Management*, 37(3): 278-291;

Gebauer, H., Bravo-Sanchez, C., Fleisch, E. (2008a). Service strategies in product manufacturing companies. *Business Strategy Series*, 9(1): 12-20;

Gebauer, H., Edvardsson, B., Gustafsson, A., Witell , L. (2010c). Match or mismatch: strategy-structure configurations in the service business of manufacturing companies. *Journal of Service Research*, 13(2): 198-215;

Gebauer, H., Edvardsson, B., Bjurko, M. (2010d). The impact of service orientation in corporate culture on business performance in manufacturing companies. *Journal of Service Management*, 21(2): 237-259;

Gebauer, H., Fischer, T., Fleisch, E. (2010a). Exploring the interrelationship among patterns of service strategy changes and organizational design elements. *Journal of Science Management*, 21(1): 103-129;

Gebauer, H., Fleisch, E., Friedli, T, (2005). Overcoming the Service Paradox in Manufacturing Companies. *European Management Journal*, 23(1): 14–26;

Gebauer, H., Fleisch, E. (2007). An investigation of the relationship between behavioral processes, motivation, investments in the service business and service revenue. *Industrial Marketing Management*, 36(3): 337-48;

Gebauer, H., Friedli, T., Fleisch, E. (2006). Success factors for achieving high service revenues in manufacturing companies. *Benchmarking: An International Journal*, 13(3): 374-386;

Gebauer, H., Friedli, T. (2005). Behavioural implications of the transition process from products to services. *Journal of Business & Industrial Marketing*, 20(2): 70-80;

Gebauer, H., Krempl, R., Fleisch, E. (2008b). Service development in traditional product manufacturing companies. *Business Strategy Series*, 9(1): 12-20;

Gebauer, H., Paiola, M., Edvardsson, B. (2010b). Service business development in small and medium capital goods manufacturing companies. *Managing Service Quality: An International Journal*, 20(2): 123-139;

Gebauer, H.,Putz, F., Fischer, T., Fleisch, E. (2009). Service orientation of organizational structures. *Journal of Relationship Management*, 8(2): 103-126;

Gephart, R. (2004). Qualitative Research and the Academy of Management Journal. *Academy of Management Journal*, 47(4): 454-462;

Goedkoop, M., van Halen, C., te Riele, H., Rommens, P. (1999). *Product service-systems, ecological and economic basics*. Report for Dutch Ministries of Environment (VROM) and Economic Affairs (EZ). Amersfoort: PRe Consultants;

Grönroos, C. (2008). Service logic revisited: who creates value? and who co-creates?. *European Business Review*, 20(4): 298-314;

Hinterhuber, A. (2004). Towards Value-based Pricing – An Integrative Framework for Decision Making. *Industrial Marketing Management*, 33(8): 765–778;

Johansson, J., Krishnamurthy, C., Schlissberg, H. (2003). *Solving the solutions problem*. The McKinsey Quarterly;

Kapil, R.T, Ajay, K.K, Sundar, G.B. (2007). Rethinking Customer Solutions: From Product Bundles to Relational Processes. *Journal of Marketing*, 71(3): 1-17;

Kim, S. H., Cohen, M. A., Netessine, S. (2007). Performance Contracting in After-sales Service Supply Chains. *Management Science*, 53(12): 1843–1858;

Kindström, D. (2010). Towards a service-based business model – Key aspects for future competitive advantage. *European Management Journal*, 28(6): 479-490;

Kindström, D., Kowalkowski, C., Sandberg, E., (2012). Enabling Service Innovation: A Dynamic Capabilities Approach. *Journal of Business Research*, 66(8): 1063–1073;

Kotler, P. (1997). *Marketing management: analysis, planning, implementation, and control*. 9th ed., Upper Saddle River, NJ : Prentice-Hall;

Kotler, P., Keller, K., Brandy, M., Goodman, M., Hansen, T. (2009). *Marketing Management*. 1st ed., Harlow: Pearson Education Limited;

Kowalkowski, C. (2010). What does a service-dominant logic really mean for manufacturing firms?. *CIRP Journal of Manufacturing Science and Technology*, 3(4): 285-292;

Kowalkowski, C. (2011). Dynamics of value propositions: Insights from service-dominating logic. *European Journal of Marketing*, 45(1/2): 277-294;

Kowalkowski, C., Kindström, D., Alejandro, T.B., Brege, S., Biggemann, S. (2012). Service infusion as agile incrementalism in action. *Journal of Business Research*, 65(6): 765-772;

Kowalkowski, C., Witell, L., Gustafsson, L. (2013). Any way goes: Identifying value constellations for service infusion in SMEs. *Industrial Marketing Management*, 42(1): 18-30;

Lay, G., Copani, G., Biege, A. (2010). The relevance of service in European manufacturing industries. *Journal of Service Management*, 21(5): 715-726;

Macdonald, E. K., Wilson, H., Martinez, V., Toossi, A. (2011). Assessing value-in-use: A conceptual framework and exploratory study. *Industrial Marketing Management*, 40(5): 25-30;

Martin, C.R., Horne, D.A. (1992). Restructuring towards a service orientation: the strategic challenges. *International Journal of Service Industry Management*, 3(1): 25-38;

Mathieu, V. (2001a). Product Services: From a Service Supporting the Product to a Service Supporting the Client. *Journal of Business and Industrial Marketing*, 16(1): 39-58;

Mathieu, V. (2001b). Service strategies within the manufacturing sector: benefits, costs and partnership. *International Journal of Service Industry Management*, 12(5): 451-475;

Matthyssens, P., Vandenbempt, K. (2003). Cognition-in-context: reorienting research in business market strategy. *Journal of Business & Industrial Marketing*, 18 (6/7): 595–606;

Maxwell, J.A. (1998). *Designing a qualitative study*. In Handbook of Applied Social Research Methods. Thousand Oaks, California: Sage Publications Inc., 69–100;

Miles, M., Huberman, A. (1994). *Qualitative data analysis – An expanded sourcebook*. 2nd ed., London: Sage Publications Ltd.;

Minichiello, V., Aroni, R., Timewell, E., Alexander, L. (1990). *In-depth Interviewing: Researching people*. Hong Kong: Longman Cheshire Pty Limited;

Mont, O.K. (2002). Clarifying the concept of product–service system. *Journal of Cleaner Production*, 10: 237–245;

Nagle, T. T., Hogan, J. E. (2006). *The Strategy and Tactics of Pricing: A Guide to Profitable Decision Making*. 2nd ed., Englewood Cliffs, NJ: Prentice Hall;

Neely, A. (2008). *Exploring the financial consequences of the servitization of manufacturing*. Operations Management Research, 1(2): 103-118;

Neu, W., Brown, S. (2005). Forming successful business-to-business services in goods-dominant firms. *Journal of Service Research*, 8(1): 3-17;

Neu, W., Brown, S. (2008). Manufacturers forming successful complex business services - designing an organization to fit the market. *International Journal of Service Industry Management*, 19(2): 232-251.

Oliva, R., Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of service Industry Management*, 14(2): 1-10;

Osterwalder, A., Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. 1st ed., New Jersey: John Wiley & Sons Inc.;

Rapaccini, M. (2015). Pricing strategies of service offerings in manufacturing companies: a literature review and empirical investigation. *Production Planning & Control: The Management of Operations*;

Salvador, A. D. (1978). *Métodos e Técnicas de Pesquisa Bibliográfica*. Porto Alegre: Sulina;

Sharma, A. (2007). The shift in sales organizations in business-to-business services markets. *Journal of Service Marketing*, 21(5): 326-333;

Sheth, J.N., Sharma, A. (2008). The impact of the product to service shift in industrial markets and the evolution of the sales organization. Industrial Marketing Management, 37(3): 260-269;

Slack, N. (2005). Operations strategy: will it ever realize its potential. *Gestão & Produção*, 12(3): 323-32;

Tukker, A. (2004). Eight types of product service system: eight ways to sustainability? Experiences from SUSPRONET. *Business Strategy & The Environment*, 14(4): 246-260;

Ulaga, W., Eggert, A. (2006). Value-Based Differentiation in Business Relationships: Gaining and Sustaining Key Supplier Status. *Journal of Marketing*, 70(1): 119-136;

Ulaga, W., Loveland, J.M. (2014). Transitioning from product to service-led growth in manufacturing firms: Emergent challenges in selecting and managing the industrial sales force. *Industrial Marketing Management*, 43(1): 113-125;

Ulaga, W., Reinartz, W. J. (2011). Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully. *Journal of Marketing*, 75(6): 5–23;

Vandermerwe, S., Rada, J. (1998). Servitization of business: adding value by adding services. *European Management Journal*, 6(4): 314-324;

Vargo, S., Lusch, R.F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1): 1-17;

Vargo, S. L., Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1): 1-10;

Windahl, C., Andersson, P., Berggren, C., Nehler, C. (2004). Manufacturing Firms and Integrated Solutions: Characteristics and Implications. *European Journal of Innovation Management*, 7(3): 218–228;

Wise, R., Baumgartner, P. (1999). Go Downstream: The New Profit Imperative in Manufacturing. *Harvard Business Review*, 77: 133– 41;

Witell, L., Löfgren, M. (2013). From service for free to service for fee: Business model innovation in manufacturing firms. *Journal of Service Management*, 24(5): 520-533;

Yin, R. (2014). *Case study research: design and methods*. 5th ed., Thousand Oaks, California: Sage Publications Inc.;

Yu-Lee, R., Haun, C. (2006). Create bullet-proof value propositions. *Industrial Management*, 48(3): 25-30;

Zeithaml, V., Brown, S., Bitner, M., Salas, J. (2014). Profiting From Services and Solutions: What Product-Centric Firms Need to Know. 1st ed., New York: Business Expert Press, LLC.

APPENDIX A: Semi-Structured Interviews Guide

Interview Questions

Interviewer:

Interviewee:

Date:

Location:

Duration:

Part I – Interviewee Details

Q1: What is your educational level?

Q2: What is your current position at Infineon Technologies?

Q3: How long have you been in your current position?

Part II – The Product Service Solution

Q4: What is the industry sector in which your business unit operates?

Q5: What kind of core product(s) does your business unit deliver?

Q6: What are the main characteristics of the product delivered by your business unit?

Q7: Is there any service related with the product?

If yes:

Q7.1 Could you please describe the service(s)?

Q8: For how long is the product service solution being offered?

Q9: What are the strengths of the product service solution delivered?

Q10: What are the weaknesses of the product service solution delivered?

Q11: How would you describe the value proposition of the product service solution delivered?

Q12: How does the product service solution impact the customer daily business (e.g. operations)?

Part III – Service Details

Q13: What are the reasons to have that (those) service(s)? *[Ask to explain further]*

○ **Financial needs and opportunities** (e.g. increase revenues, economic cycles affecting product sales)

○ **Strategic needs and opportunities** (e.g. improve ability to respond to customer needs, increase customization of your offer, differentiate your offering from competitors, setting barriers to competitors, capturing customer needs for product design updates)

○ **Marketing needs and opportunities** (e.g. customer pressure, increase customer loyalty, create the opportunity to offer other products and services)

○ **Others** (e.g. government incentives, standards and regulations) *[if others is chosen, ask to please specify]*

Q14: In your opinion, what is the value-added of the services component?

Q15: How would you rate the level of quality of the service(s) offered? Why?

○ 6 ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

[6 = High quality; 1 = Low quality]

Part IV – Product Service Solution Design, Development and Delivery

Q16: How long did it take to design and develop the product service solution?

Q17: Who was involved in the design and development of the product service solution (internal and external) (e.g. organization employees, customers, external suppliers, others)?

Q18: Which activities were conducted to design and develop the product service solution?

Q19: Which challenges have you faced in the design and development of the product service solution (internal and external factors)?

Q20: Do you use partners to deliver the services component? If yes, which partners?

Q21: What changes where done in order to provide the service(s) in addition to your product (e.g. organizational structure, processes, technological)?

Q22: To what extent do you involve customers in the design and development of your products and services? *[Ask for examples]*

○ Low ○ Medium ○ High

Q23: In which stages of the process do you involve customers?

Q24: To what extent is the product service solution tailored to the customer needs?

○ Low ○ Medium ○ High

Q25: Do you consider that there is a clearly defined service development process within the organization?

Part V – Pricing & Financial Context

Q26: How much was the total investment to design and develop the product service solution (internal and external)?

Q27: In what is the pricing of the product service solution based on?

- **Cost** (the cost plus a chosen profit margin)
- **Competition** (the market pressures influence price)
- **Value** (price is proportionate to the value created for customers)

Q28: What are the reasons that lead to the choice of that pricing strategy?

Q29: How is the price of the product service solution presented?

- **Bundling** (global price for product & service)
- **Unbundling** (product and service are priced individually)

Q30: What are the reasons that lead to the choice of that pricing scheme?

Q31: Does the established pricing scheme used for the solution offered cover your costs with it?

Q32: Do you consider that the pricing scheme fits customer perception of value and encourage customers to use your product service solution regularly? How?

Q33: Do you consider that the quality of the service(s) in the solution could lead to a premium price? Why?

Q34: What is the impact of the services component in the overall profit gained from the product service solution delivered (if compared with the "just product" offer)?

Q35: What is the impact of the services component in the overall revenue generated from the product service solution delivered (if compared with the "just product" offer)?

Q36: In your opinion, do you consider that services can bring additional economic benefits to the organization? How?

Part VI – Strategic Context

Q37: Who are the main competitors of the industry where the product service solution is in?

Q38: Do your competitors offer the same product service solution or similar?

Q39: Regarding the service(s) in place, is (are) this (these) the same or similar?

Q40: Do you consider that the services component help to differentiate your solution from the competitors? How?

Q41: Do you consider that, with the product service solution, the business unit undertake risks previously taken by your customers?

If yes:

Q41.1 Could you please specify which risks are those?

Q42: Do you consider that the services component is created in a conscious and strategic way?

Q43: How would you characterize the organization culture regarding services?

Q44: Do you consider that the existing organization culture allows integrating a deeper and clearer service strategy? Why?

Q45: Do you consider that the current organization strategy focus on promoting services and creating new services? How?

Q46: In general, how would you rate the importance of services in the semiconductor industry?

○ 6 ○ 5 ○ 4 ○ 3 ○ 2 ○ 1

[6 = High importance; 1 = Low importance]

Q47: Overall, how do you see the future of services within your business unit?

Part VII – Sales Context

Q48: Would it be possible to sell the product without the services component?

Q49: Does the product per se respond to customer's needs?

Q50: Who are the customers that buy the product service solution?

Q51: Who are the customers that don't buy the product service solution?

Q52: How do you explain the product service solution to customers?

Q53: Do you make the value of the service(s) visible when selling the solution to the customers?

If yes:

Q53.1: How do you make the value of the service(s) visible to your customers?

Q53.2: Do you use indicators to demonstrate the value of the service(s) to your customers? Which ones?

○ Improvements in product performance

○ Improvements in product-related activities

○ Monetary savings

○ Others *[if other is chosen, ask to please specify]*

If no:

Q53.3 Why is the value of the services not shown when selling the solution to customers?

Q54: What are the main challenges you face when trying to sell the product service solution to your customers?

Q55: In your opinion, how much does the services component influence the customers purchasing decision? Why?

○ No influence ○ Low ○ Medium ○ High

Q56: In which way does the services component contribute to the value (of the overall offer) perceived by the customers?

Q57: Do customers have the perception of the quality of the services that are related to the product?

Q58: What is the customers' feedback about the product service solution delivered? *[In case it was not collected, ask why]*

Q59: What is the impact of the service(s) in the overall customer satisfaction with the product service solution delivered (if compared with the "just product" offer)? *[In case the customer satisfaction is not measured, ask why]*

Q60: Do you consider that your customers' expectations have been increasing throughout time?

Q61: In your opinion, how does a product service solution helps to respond those expectations?

APPENDIX B: Categorization of Unstructured Interviews

Table 14 - Categorization of Unstructured Interviews

Themes	*Examples of notes used for coding*
Product Service Offering	In general, products are sold and the support and application engineering services are included; People with low awareness on services provided; Services seen as an add-on.
Competition and Differentiation	People do not understand the importance of services to provide differentiation in the market; Services are part of the whole offer that makes customers consider working with Infineon; It's not just the product that matters.
Organization Culture	Product centric thinking; Strong product based culture; Organization strong focus on hardware, volume and mass production; Need to bring a consistent culture of services across the entire organization.
Organizational Configuration	One situation where existing system does not allow selling services.
Design, Development and Delivery	Services were only started to be discussed after the product press release was done; Services are not considered on the product design and development process from the beginning; Services are provided in an unconscious way.
Value Proposition	Value proposition is not comprehensively thought.
Pricing Strategy	The customer pays for the product and services are provided free of charge; Services offered are paid via the product selling price;
Economic Earnings	It is necessary to realize if there is a service revenue opportunity or if services can be offered with the product and contribute to price negotiations.
Sales of Services	Services should be mentioned on the moment of selling.

APPENDIX C: Categorization of Semi-Structured Interviews (CSI)

Table 15 - Categorization of Semi-Structured Interviews (CSI)

Themes	*Subthemes*	*Examples of notes and quotes used for coding*
Product Service Offering	**Products and Services**	**Complex product**: "It is a complete transceiver which has a lot of devices mixed… so the device is quite complex." **Services that support the product**: "The service is mainly related to how to use our product in a system"; "The product itself we are not customizing, it is more around the product, how to customize their complete design around our products, meaning that the product is always the same but the rest around changes and this we can do with the different service modules we are offering. We have from standard support up to customizing the service."
Competition and Differentiation	**Competitors**	**Two main competitors** **Competition starting to develop similar product:** "The main competitors are coming from the US. A lot of startups are working on this. In the meanwhile there are 2 big US semiconductor companies which bought startups who are in competing with us and are now in this market."
	Differentiate Through Services	**Services seen as a mean for differentiation:** "Yes, I definitely see services as an advantage because of this way how you do it, how you support them. It is a different way. The other way is more of that you wait and here we are more proactive."; "[…] and with the services I think we can differentiate further [...]"
	Quality of Services Delivered	**Quality of services - Average rate of 5:** "Because we know what we did and the partner is really good."; "I hope we will improve this further."
	Importance of Services	**Importance of services seen as increasing: Average rate of 5**: "Services are getting more and more important. It is getting more important because we are going up in the value chain."
Organization Culture	**Culture**	**Product centered culture**: "Our culture is more on the product."; "The culture can allow services but there is a difference on the services that are free of charge and that are paid." **Resilience from people to accept the services charging**: "With this, we had more discussions on our jourfixes where more people are in and they said yes, but nobody will pay for it."; "But the feedback [from Sales] was mainly, we will not bring this to the customer." **Services seen as an add-on**: "All the support issue is nice to have. But the product features are

		the most important to the customer.”
Organizational Configuration	**Focus on Key Customers**	**High focus on key customers**
	Structure, Processes and Technology	**System not built to sell services**: “The Tax group… they said services, Infineon cannot sell because this is not implemented in our systems. Then we thought oh, everything is done and now we have to stop.”
		No changes on organization structure or processes to deliver services: “There is nothing new in general, technology or processes… it is all existing.”
Design, Development and Delivery	**Services Design and Development**	**Assumption of customer needs:** “We said it should be much easier now but it was the opposite as we got even more questions. For us, it seems that the product itself was interesting for the customers but it is not easy to understand it.”
		No experience in designing & developing PSS: “We asked several people at Infineon if they had this and they all said no.”
		Services not considered during the product design & development
		No clear design & development process for services: “No. When started this idea we looked around to see if this was existing somewhere… we don’t know everybody in the company – it is too big, it is not easy to get all the info… but at least we found out that such a process was not existing. This was one conclusion out of this investigation… But the process for services development does not exist in Infineon.”; “In general, it is not really created in a conscious and strategic way. It is more by accident.”
	External Involvement	**Customer not involved on service design & development, only for product:** “For the product, a customer was involved in the development phase. For the service, the customer was not involved in any stage.”
		Existing partnership for design, development & deliver of PSS: “Yes. A partner from [...] called […] They are doing the design together without team and one person is dedicated who will do this service support.”
	Internal Communication	**Trainings about PSS setup**: “All people involved in the service deliver had a training and access to information about it (Application Engineers, Sales)”
		Salespeople claim to not have training on PSS: “Nobody explained honestly, to say really… I think it should have been explained to Sales how to deal with it. Maybe there was a short presentation in PowerPoint, I don’t know, I was not aware of it."; “As far as I know, none of the Distributors have been trained in any support model.”
	Weaknesses	**Additional effort and people on Infineon side:** “Is that additional people are needed, which are educated… which cannot do other tasks at the same time, which they usually could do, especially

		in the application engineering which are supporting customers."
Value Proposition	-	**Value Proposition - Time-to-market & cost reduction for customer**: "We bring customers our expertise which helps him saving time and money. This is the value that this model has to customers."
		No indicators to demonstrate the value of services
Customer Satisfaction	-	**Customer satisfaction not measured & Customer feedback not gather** **Overall, customers are satisfied with PSS**: "[…] So, the customers are very appreciated about [the PSS]."
		Customer is aware of the quality of the services: "Yes, they have a good perception of the quality of the services."
Pricing Strategy	-	**Product based on cost and service based on value**: "We say we will not look at the competition, we will see what the customer would gain from this … which way we could give for them… how much could it be worth." **Key customers are not charged for the services**: "The only discussion we had with the top 3 customers of this business was that they said "we will never pay". And there, for sure, we had to do a compromise because you are the number 1 or 2 in the world but you have to give us a business."
Economic Earnings	-	**Services as a mean to earn additional revenue**: "So we thought that, if these customers have so many questions, the others will have even more. And if we have all this effort, why not try to get some money from this?"; "If the customers pay for them as we are planning, we get also some additional revenue from that [...]" **No intention to make high revenue with services but to create a relationship with customer & increase their loyalty**: "The intention was not really to make a lot of revenue with the services model, we want customers using our product in the end and long term engaged with us and not working with competition." **Main economic earnings coming from products**: "Because services is not where we earn a lot of money. The main economic earning is still from the product selling. The revenue we get it via the product." **No info about profit & revenue**
Sales of Services	**External Communication**	**PSS not clearly explained to customers**: "Honestly, I did not explain it to the customer at all." **Value of services not clearly shown to customers**: "The value of the services is not made visible because the contracts are just forward to the customer and he should read them and decide. So, in the contracts is shown very clearly what you get with your chips."

	Challenges	**Customers not used to pay for services**: "They [customers] all asked "why should I pay for this?" It is standard. Why should I pay something? What do I gain? These were the questions we got in the beginning." **Convince customers to use and pay the PSS**: "[…] then to convince the customer that it is worth that they use it and pay for it [...]." **Paperwork involved**: "It was a lot of paperwork, it is very complex. You have a service level contract, you have a frame agreement and it is quite difficult, to be honest." **Buyer Purchasing people focus on price**: "Buyers only look at the hardware price. When a project starts you do not discuss with the purchasing. You go to the R&D department. The department says everything is very nice, give me an offer for your calculation and, for Purchasing, you only get the hardware costs and the services do not influence." **Salespeople are not used to charge a fee for services**

APPENDIX D: Categorization of Semi-Structured Interviews (CSII)

Table 16 - Categorization of Semi-Structured Interviews (CSII)

Themes	*Subthemes*	*Examples of notes and quotes used for coding*
Product Service Offering	**Products and Services**	**Complex products**: "The complexity of our products is such that technical support is required." **Services that support the product**
Competition and Differentiation	**Competitors**	**Three main competitors** **Competitors offer similar products and services:** "They offer the same product. […] They are offering similar services. Whether they charge it or not, I don't know but I assume they charge."
	Differentiate Through Services	**Services seen a mean for differentiation**: "If you have a unique product and unique selling point, possibly you don't need services because you are the only one having that product. But if you are in a commodity market, that means where there is a lot of competition and they have the same product and the only differentiators you have are the services."
	Quality of Services Delivered	**Quality of services - Average rate of 5,5:** "I believe we are pretty good. Because of the experience and know-how."
	Importance of Services	**Importance of services seen as increasing: Average rate of 4**: "I think that the services part can increase especially when we address new segments, new markets, new customers because from the start we can start selling the services, let's say, as a separate part next to the products."
Organization Culture	**Culture**	**Product centered culture (organization): "**I believe this is not a real secret… Infineon is set to be a technology driven company." **Customer oriented (business unit)** Resistance from people to accept the services charging **Services seen as an add-on (organization)**
Organizational	**Focus on Key Customers** **Structure, Processes and**	**High focus on key customers** **Existence of a customer services department**

Configuration	Technology	
Design, Development and Delivery	**Services Design and Development**	**Services considered during the product design and development** **Clear design and development process for services in the business unit:** "When we are developing a product, the need of a service is considered from the beginning. This is part of the development plan where the Product Marketing has to plan for trainings, for a rollout, for road shows… for a lot of things. As well for the documentation." **Room for improvement:** "But the reality is still, let's say, not ideal." **No clear services design and development process in the organization:** "I don't think so. Because I have seen partly and I have talk to other people from other Divisions."
	External Involvement	**Existing partnership for design, development and delivery of services:** "Yes. For the Tools, we have a partner. We have several partners […] But for the others we use at least 5 or 6 different partners."
	Weaknesses	**People needed on Infineon side to deliver the services:** "Mainly the headcounts. Customers do not pay for that standard technical services, it is just a cost center factor and you have to add that somehow to the total costs of the product."
Value Proposition	-	**Value Proposition - Time-to-market & cost reduction for customer**: "It is connected to each other, product and service. […] The services is most likely related to the point that the customer has to possible spend some money but, on the other hand, he saves a lot of money.", "[the customers] have a much faster market introduction and much better perceived value proposition of Infineon." **No indicators to demonstrate the value of services:** "I don´t think that there is a clear indicator. I think that the customer experiences on itself […]"
Customer Satisfaction	-	**Customer satisfaction measured & Customer feedback collected by customer services department** **Customers are satisfied with services**: "Positive. Only positive. I have never seen a negative. […] On services I only get positive testimonies from my people, that they are really thankful." **Customer is aware of the quality of the services**
Pricing Strategy	-	**Product based on cost & service based on value**: "Of course we orient on standards in the market. […] A price of something does not necessarily have to do something with the cost. The services are based on value." **Always placing a price tag on services**: "Something which does not cost anything, it's not worth anything. That means you have at least to put a price tag on it. Whether you give it for free or not, that's a different story but at least give it a value." **Key customers are not charged for the services**

Economic Earnings	-	**People from customer services department try always to ask a fee for the services**: "[…] at least we try to sell it to the customers. Sometimes we give it for free due to strategic reasons but at least we put a price tag on it." **Main economic earnings coming from products:** "I cannot sell so many services. We would not be able to carry ourselves on that… If I take my organization here, those people would have to be paid out of the services we get paid for… this does not work. For the Tools, yes, we have some margin on that but the services, if we have that one for free and some pay for this and that one."; "We have to live from the product sales but services help to sell more products." **Services as a mean to earn additional profit and revenue:** "And you see that the product price is declining faster than the product costs.[…] We sell them [the customers], for example, engineering expertise just to switch from one platform to the other. Then I don´t have to give them the whole price decline. […] at the end of the day implicitly we are generating a limit to the price decline. We can optimize these price negotiations."; "By selling more products or even being faster in the sales cycle." **No info about profit & revenue**
Sales of Services	**External Communication**	**Value of services not clearly shown to customers by salespeople; customer services dep. tries to do it**: "Me personally, would focus on the services. Our Sales guys focus on the product, of course, and the services is just a nice thing around."; "That's what we try to teach our Sales guys, to our Key Accounts. Even if we do not bill our customers for the services and if they go into price negotiations, that they do not forget that we spent for a Key Account, 5 full people in the world, if you count for it."
	Challenges	**To have salespeople charging a fee for services: "**Since we are not doing the charging to our Key Accounts since a long time, it's always a challenge to educate, at least from our service oriented point of view, the Sales organization." **Salespeople are not used to sell services:** "The sales force that we have in place is used to sell products and is not used to sell services. If we want to change that then we have to tell them, we have to give them the arguments, we might need to create a kind of sales package where we then show the value of the service so that you have arguments to discuss it with the purchaser on the other side." **Customers not used to pay for services:** "The main challenge is that the customer says "I have paid for the product, I don´t want to pay for the service". That is a general attitude. **Convince customers to pay the services:** "[...] If for ten years you have been offering trainings for free then it is difficult to come tomorrow to him and say "by the way, a training we consider as a service and services need to be paid, so in the future I will invoice you the trainings". That is

		difficult. That is always something you can try but it is always difficult if you are already in running business and have a relationship with the customer and you have been offering them for free in the past." **Buyer Purchasing people focus on price:** "The Purchasing guys are looking at the chip price. What they never see is how much support (technically) we give to the customer."

APPENDIX E: Services Categories (CSI)

Table 17 - Services Categories (CSI)

Category	*Services*
Free of Charge	Light Application Notes, Q&A, FAE Support
Standard	Evaluation Kit, Samples, Basic Lab Training
Basic	Evaluation Kit, Application Kit, Lab Training
Expert	Customized Service Package, Expert Visit
Advanced	Joint Customer Board Design in Agreed Timeframe, Lab Training

APPENDIX F: Service Groups (CSII)

Table 18 - Service Groups (CSII)

Group	*Services*
Technical Services	Support, Training, Consulting, Special Measurements
Software Services	Libraries
Standard Services	Software Development Kit, Documentation, Data Sheets
Production Services	Programming, Data Loading, Personalization